ANGLOGOLD ASHANTI
AUSTRALIA

TROPICANA JOINT VENTURE
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21 December 2017

Anthony Sutton
Director - Assessment and Compliance
Assessment and Compliance Division
Department of Water and Environmental Regulation
Locked Bag 10
EAST PERTH WA 6892

Dear Anthony,

Tropicana Gold Project Ministerial Statement No. 839 – 2016/2017 Annual Compliance Assessment Report

In accordance with Condition 4-6 of Ministerial Statement No. 839, please find enclosed the 2017 Annual Compliance Assessment Report for the Tropicana Gold Mine. The report has been prepared in accordance with the Tropicana Gold Mine Compliance Assessment Plan and covers the period 24 September 2016 – 23 September 2017.

If you have any enquiries, please contact Rosemarie Lane, Superintendent: Environment, at tgmapprovals@anglogoldashanti.com or on 9265 2215.

Yours faithfully

Rosemarie Lane
Superintendent: Environment
Tropicana Gold Mine

Enclosed: CAR20171221 "Tropicana Gold Mine Ministerial Statement No 839 Annual Compliance Assessment Report"

Tropicana Joint Venture

Tropicana Gold Mine (TGM)
Ministerial Statement No 839
Annual Compliance Assessment Report
24 September 2016 to 23 September 2017

21 December 2017

Document Reference: CAR20171221

Tropicana Gold Project, Annual Compliance Assessment Report

Ministerial Statement No. 839

CAR20171221

This report has been developed by AngloGold Ashanti Australia on behalf of the Tropicana Joint Venture.

Revision	Author	Reviewer	Date
Draft - for internal review	S. Brown	M. Stingemore	14 December 2017
Final – for review and release	S. Brown	R. McLeod	21 December 2017

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1 Introduction

The Tropicana Gold Mine (TGM) (the Project) is an open cut gold mine located approximately 330 kilometres (km) east northeast of Kalgoorlie on the western edge of the Great Victoria Desert (GVD) (Figure 1). The operation is a joint venture (Tropicana JV) between AngloGold Ashanti Australia Ltd (70% stakeholder and manager) and Independence Group NL (30% stakeholder).

The Project was approved under the *Environmental Protection Act 1986* (EP Act) in September 2010 and issued with Ministerial Statement No. 839 (MS839). Condition M4.6 of MS839 requires the preparation and submission of an annual compliance assessment report for the preceding 12 months.

This report has been prepared to meet Condition M4.6 and covers the period 24 September 2016 to 23 September 2017. The TGM Ministerial Statement audit compliance table updated for the 2017 reporting period is provided in Appendix 1.

The TGM is comprised of:

- Operational area - containing the open pits, waste landforms, stockpiles, tailings storage facility, processing plant, mine village, aerodrome and other supporting infrastructure.
- Infrastructure corridor - including an access road and communications corridor linking the operational area to existing communications and road networks of the Goldfields regions. This corridor is referred to as the Pinjin Corridor.
- Process water supply area – containing the process water supply borefield (PWSB).

This is the seventh Compliance Assessment Report (CAR) prepared by AGAA on behalf of the Tropicana JV for the Project and has been prepared in accordance with the approved Compliance Assessment Plan (CAP) dated 13 December 2010 prepared and submitted to the Office of the EPA in 2010.

1.1 Approvals History

Subsequent to the issuance of MS839 in September 2010, the Tropicana JV has sought and gained approvals under section 45C of the EP Act to implement non-substantial changes to the original approved Project (Table 1).

Table 1: Non-substantial changes to MS839 Key Characteristics

Application	Date Approved	Element	Original Proposal	Approved Change to Proposal
Tailings Storage Facility Design – Two Cell vs. Single Cell. August 2012	19 November 2012	Tailings Storage Facility	Up to 7 mtpa; two-cell paddock tailings storage facility with possible in-pit TSF deposition. Maximum height of 372 mRL. Approximately 1330 m wide by 1850 m.	Up to 7 mtpa; single-cell paddock tailings storage facility with possible in-pit deposition. Maximum height of 372 mRL. Maximum 292 ha footprint.
Water Supply Area Increased Footprint and Abstraction Volume. September 2014	17 December 2014	Mining Rate	Up to 75 mtpa (ore and waste)	Removed as not a significant key characteristic relevant to the environment.
		Stripping ratio	8:1	Removed as not a significant key characteristic relevant to the environment.
		Water Supply	Up to 7GL/year	Up to 9 GL/year
		Mine Access Road	Pinjin Option – 370 km (~210 km of road construction)	Pinjin Route – 370 km (~210 km of road construction.
		Communications	Fibre Optic or Microwave via either Pinjin or Tropicana Transline Corridor	Removed as not a significant key characteristic relevant to the environment.
		Main Power Supply	Onsite power station with an installed capacity of up to 40 Mw	Removed as regulated under Part V of the *Environmental Protection Act 1986*.
		Disturbance Area	Not more than 3,440 ha comprising: • Operational area – 2,570 ha • Water supply area – 200 ha • Infrastructure area – 670 ha	Not more than 3,540 ha comprising: • Operational area – 2,570 ha within 27,241 ha Operational Development Envelope. • Water supply area – 300 ha within 19,663 ha Water Supply Area Development Envelope. • Infrastructure areas – 670 ha within 4,269 ha Infrastructure Development Envelope.
		Figures	Figure 1 – Regional location of mine site Figure 2 – Proposal footprint and conceptual layout of key components	Figure 1 and 2 of Schedule 1 replaced by: Figure 1: Development Envelopes Table 2: Development Envelopes – Map Grid of Australia (MGA) Zone 51 Coordinates.
Operational Area Waste Landform. October	8 December 2016	Overburden and waste	Not more than 800 mt	Not more than 800 mt placed in waste landforms
		Waste landform	Not more than 1,200 hectares. Maximum height 375 mRL. Slope with maximum angle of 15 degrees	Not more than 1,200 hectares. Maximum height 417 mRL including rehabilitation cover. Slope with maximum angle of 15 degrees.

Application	Date Approved	Element	Original Proposal	Approved Change to Proposal
		Tailings Storage Facility (TSF)	Up to 7 mtpa; single-cell paddock tailings storage facility with possible in-pit deposition. Maximum height of 372 mRL. Maximum 292 ha footprint.	Single-cell tailings storage facility with possible in-pit deposition.

2 Current Status

Key activities undertaken during the reporting period included:

- Continuation of mining in the Tropicana, Boston Shaker and Havana Open Pits.
- Commencement of mine development of the Havana South Open Pit.
- Expansion of waste landform height in accordance with approved Section 45C.
- Continued Processing plant operation and gold production.
- Groundwater abstraction from the Process Water Supply Borefield and Kamikaze Borefield.
- The TGM Mine Closure Plan was revised and updated in accordance with the 'Guidelines for Preparing Mines Closure Plans' (May 2015) and submitted to DMIRS in February 2017.

Table 2 provides an overview of the Project's key characteristics and current status while the updated disturbance footprint is shown in Figure 1, Figure 2 and Figure 3

Table 2: Tropicana Gold Project Key Characteristics Table Status Report

Element	Description	Status / Comment
General		
Project Life	Approximately 15 yr. of mining; total project duration up to 25yr (including post closure monitoring)	Mining and Processing activities continued at a steady rate during the reporting period.
Mining and Processing		
Number of pits	Up to 4	3 current Open Pits (Tropicana, Havana and Boston Shaker)
Open pit void/s	Not more than 400 hectares	Current open pit area: 269.08 ha
Max. length of pit/s	6 kilometres (if pits combine)	Current max. open pit length: 3.37 km (Havana/Tropicana combined)
Max width of pit/s	1.5 kilometres	Current maximum width of Havana pit is approximately 780m
Overburden & waste	Not more than 800 million tonnes placed in waste landforms.	137.9 Mt of waste material placed in waste landforms LEA – 95.1 Mt LTA – 15.0 Mt LWE – 27.8 Mt
Waste landform	Not more than 1200 hectares. Maximum height 417 mRL including rehabilitation cover. Slope with maximum angle of 15 degrees.	Current Waste landform area: 589.31 ha Current max height: 397.3mRL (AHD71).
Water Supply	9 gigalitres per annum	5.6 GL in reporting period.
Dewatering Rate	1,000 to 5,000 kilolitres per day	226,870 kL total volume dewatered during reporting period. Average dewatering rate of 621 kL per day.
Infrastructure		
Mine access road	Pinjin Route –370 km (~210 km of road construction)	Pinjin Mine Access Road construction was completed during the 2012 reporting period.
Aerodrome	All weather strip 2.4 km long	Aerodrome completed and commissioned. 2.1 km all weather strip.
Water Pipeline	Approximately 50 km in length from the borefield (located north northwest of Operational Area) to the process plant	Pipeline completed and commissioned. Pipeline length is approximately 42 km.
Tailings Storage Facility (TSF)	Single-cell tailings storage facility with possible in-pit deposition.	Single-cell TSF constructed and operated.

Element	Description	Status / Comment
	Disturbance Areas	
Disturbance Area	Not more than 3,540 ha comprising: • Operational area – 2,570 ha within 27,241 ha Operational Development Envelope. • Water supply area – 300 ha within 19,663 ha Water Supply Area Development Envelope. • Infrastructure areas – 670 ha within 4,269 ha Infrastructure Development Envelope.	Total current disturbance footprint: 3061.70 ha Operational Area: 2228.09 ha Water Supply Area: 207.44 ha Infrastructure Area: 626.16 ha Note – the Operational Development Envelope and the Infrastructure Development Area defined by Schedule 1 of MS839 overlap. To avoid duplication of disturbance data, the Infrastructure Development Envelope has been cropped to outside the Operational Development Envelope for reporting purposes.

Note – Data recorded as at 30 September 2017

3 Compliance

The 2016-2017 reporting period represents the seventh reporting period for the TGM and the fourth full operating period for the TGM, with the processing plant commencing operation during September 2013.

During the 2017 reporting period the Tropicana JV was compliant with all ministerial conditions associated with the Conditions of MS839. A completed audit table providing further detail on compliance with conditions is included in Appendix 1.

As advised in the 2016 Tropicana Gold Mine Compliance Assessment Report (CAR) for Ministerial Statement 839 (MS 839), the Tropicana JV identified and self-reported that the spatial extent of the Infrastructure Development Envelope does not completely align with the *Mining Act 1978* tenure upon which the Pinjin Mine Access Road is constructed. As a consequence, sections of the Pinjin Access Road and associated infrastructure are not consistently located within the Infrastructure Development Envelope.

A detailed review of the alignment of the spatial extent of the Infrastructure Development Envelope described in Schedule 1 of MS839 and the constructed Pinjin Mine Access Road has determined that the Pinjin Mine Access Road was developed in accordance with MS839 as per the original project approval. An approved variation to MS839 Schedule 1 on 17 December 2014 erroneously altered the spatial extent of the Pinjin Mine Access Road corridor when defining the Infrastructure Development Envelope in Schedule 1. This administrative error resulted in sections of the existing Pinjin Mine Access Road and associated infrastructure falling outside the incorrectly defined Infrastructure Development Envelope.

In June 2017 the then OEPA advised that to resolve the issue, the Tropicana JV was to submit a Section 45C application to the Minister for Environment to revise Figure 1 and Table 2 of MS839. The Tropicana JV has prepared and submitted a Section 45C application which is currently under assessment by the Department of Water and Environmental Regulation (DWER).

In accordance with the CAP, the CAR for the 2017 reporting period will be made publicly available once the Tropicana JV has received acknowledgement from the DWER that the report has been accepted. A copy of the CAR 2017 will then be placed on the Tropicana JV website.

No changes have been made to the previously approved CAP during this reporting period (Condition 4.1 of MS839).

4 Environmental Monitoring

During the 2017 reporting period groundwater, surface water, vegetation condition and fauna monitoring programs were undertaken and the results were analysed. Details of monitoring activities conducted throughout 2017 and further analysis on monitoring results is provided to the Department of Mines, Industry Regulation and Safety (DMIRS) and Department of Water and Environmental Regulation (DWER) in separate annual reports.

Groundwater monitoring from the sixteen (8 deep and 8 shallow) monitoring bores installed around the TSF and waste landform footprints (Figure 4) was undertaken throughout 2017. A summary of results from the sampling events are provided in Appendix 3. Results obtained from these monitoring bores were compared with trigger values which were established in 2014. Analysis of results indicates that changes in groundwater quality (baseline groundwater quality +/- 10%) has occurred at some monitoring bores.

ENVMB001, located to the north of the TSF, has displayed results for multiple parameters that are above baseline water quality triggers values, including Boron (Bo), Calcium (Ca), Chloride (Cl), Cobalt (Co), Magnesium (Mg), Nickel (Ni), Nitrate (NO_3), Sodium (Na), WAD Cyanide (Cn), Electrical Conductivity (EC) as well as Total Dissolved Solids (TDS). Groundwater quality changes at ENVMB001 are influenced by the operation of the nearby TSF.

Conversely, monitoring for ENVMB004 has recorded results below the minimum trigger values for three (3) parameters, including Bicarbonate Alkalinity ($CaCO_3$), Boron (Bo) and Sulphate (SO_4). Results recorded lower than the minimum trigger value are considered to be associated with natural fluctuations in groundwater quality and not associated with operational activities.

Localised changes in groundwater quality are not considered to have any detrimental impact to environmental values. The existing groundwater environment is typically saline to hypersaline and has no known beneficial users. No stygofauna were identified within the Operational Area during baseline surveys. Monitoring of vegetation condition in proximity to operational areas has not identified any impacts to vegetation health associated with changes in groundwater quality.

To mitigate potential impacts to environmental values, AGAA implemented a Seepage Mitigation Project in 2016. The Seepage Mitigation Project was continued throughout the reporting period, including ongoing operation of six (6) seepage recovery bores. During the current reporting period the following improvements have been made to the project:

- Drilling of two (2) additional groundwater recovery bores on the southern side of the TSF;
- Installation of an additional groundwater recovery bore on the Northern side of the TSF.

AGAA will continue to monitor groundwater across the TGM and will implement additional mitigation actions as and when required to minimise the environmental impacts of the operation. The next review of the Environmental Monitoring Strategy will re-evaluate the 10% variation against baseline groundwater quality trigger, particularly in the context of a saline to hypersaline groundwater environment.

Surface water monitoring sites have been established around the TSF and waste landforms (Figure 5) as required by M8.2. Due to the absence of continuous standing surface water, samples from these locations have only been obtained following rainfall events where there is surface water runoff (>20 mm rainfall in 24 hours). Results from surface water sampling locations are provided in Appendix 4.

Monitoring of vegetation condition and abundance is required on an annual basis across TGM in accordance with Condition 5-2 of MS839. A Vegetation Monitoring Strategy (VMS) was developed in 2011 to achieve the requirements of Condition 5-2. The VMS was designed using an integrated remote sensing (entire site) and targeted field assessment (local scale) approach to detect and quantify decline in vegetation condition that may result from any of the identified impacting processes. In 2016 health and cover indices were recorded using a combination of remote sensing and field assessment techniques.

The VMS establishes the vegetation monitoring triggers for the Project. Triggers relate to native vegetation cover and productivity, indicator species, clearing boundaries, weeds, and rehabilitation. The 2016 program involved an assessment of the survey findings against three of the Project triggers – Trigger 1 (25% deviation in cover or productivity within monitoring (impact) sites relative to reference sites), Trigger 5 (Identification of a weed species in a site where it had not previously been recorded) and Trigger 6 (25% increase of weed species in abundance or cover relevant to reference site) as outlined in the VMS.

The 2016 monitoring program was undertaken by Eco Logical Australia Pty Ltd in October 2016 (Appendix 9). The monitoring program involved assessment of high resolution digital multi-spectral imagery and field survey verification at 112 quadrats (20m by 20m in size). The locations of the vegetation monitoring sites are shown in Figure 6.

Overall no impact sites in any of the three core areas required further investigation under Triggers 1 and 2.
Trigger 5 (Identification of a weed species in a site where it had not previously been recorded) was exceeded as weed species were found at sites A3-3 and A3-4. Trigger 6 (25% increase of weed species in abundance or cover relevant to reference site) however did not require investigation as this was the first year weeds have been recorded in the quadrats.

Operational Area:

One site had a decrease in overall foliar cover by more than 25% in comparison to the baseline. When the deviation of this site was compared to the reference site, however the deviation was less than 25%. As noted in previous years, this variation is likely due to termite activity and natural senescence of *Triodia* and not due to the Project activities. The comparison of impact sites and paired reference sites showed no overall foliar cover deviation decrease of more than 25% for the 2016-2015 assessment.

No weed species were recorded in any quadrats in the Operations Area, and therefore Trigger 5 (Identification of a weed species in a site where it had not previously been recorded) and Trigger 6 (25% increase of weed species in abundance or cover relevant to reference site) do not require further investigation.

Infrastructure Corridor

Four impact sites (E4-11, S8-2, S8-3 and S8-7) had a decrease in overall foliar cover which exceeded 25% deviation for the 2016-baseline comparison. The same four sites experienced similar loss over 25% in the 2015 survey. These sites have all been burnt and are currently experiencing post-fire regeneration. Comparisons between the deviation of these impact sites with their respective reference site show the deviation is no more than 25%, or were an increase in cover of more than 25%, therefore no further investigation was required under Trigger 1.

Three individuals of the introduced species (weed) *Salvia verbenaca* (Wild Sage) were recorded at site A3-3 and one was recorded at site A3-4. During the 2015 survey this weed species was recorded approximately 50 m from site A3-4, and it has likely spread further due to above average rainfall received in the 12 months prior to the survey. This site is located in the Pinjin Pastoral Station, which is an active cattle station and therefore the occurrence of this weed in these sites is likely to be related to pastoral activity. As a result of weeds being recorded in these quadrats, Trigger 5 (Identification of a weed species in a site where it had not previously been recorded) was exceeded. Trigger 6, which is: 25% increase of weed species in abundance or cover relevant to reference site, did not require investigation in this year of monitoring as this was the first year weeds have been recorded and there is therefore no baseline data to compare to. In the next round of monitoring (2017) assessments will need to be made against Trigger 6 at sites A3-3 and A3-4.

Process Water Supply Borefield:

In total four impact sites (E2-5, X1-1, X1-7 and X1-9) had a decrease in deviation of overall foliar cover which exceeded 25% relative to the 2016 baseline comparison. Of these, one site, X1-9 also had a negative difference of -57% relative to the paired reference site, which exceeded the 25% deviation under Trigger 1. This difference is consistent with results from 2015, and is due to a lightning initiated fire that burnt the site in 2012. This site continues to have healthy regeneration. As the vegetation cover decline is due to a fire and is successfully regenerating, no further investigation was required under Trigger 1. There were no sites that had a decrease in overall foliar cover from 2015 to 2016.

No weed species were recorded in any quadrats in the Process Water Supply Borefield, and therefore Trigger 5 (Identification of a weed species in a site where it had not previously been recorded) and Trigger 6 (25% increase of weed species in abundance or cover relevant to reference site) do not require further investigation.

Fauna monitoring conducted during the reporting period has included:

- Daily wildlife inspections at the Tailings Storage Facility (TSF).
- Fauna observations at the TSF by Donato Environmental Services to support the TGM Cyanide Code certification.
- Photographic monitoring of artificial water sources (Plate 1 to Plate 3).

A number of artificial water sources have been established around the TSF to provide an alternative water sources for wildlife which are monitored via motion sensing cameras and periodically reviewed. Photographic monitoring has captured a number of fauna species utilising the artificial ponds including a variety of birds, marsupials, mammals and reptiles.

Priority flora species identified during flora and vegetation surveys at TGM, have been referenced and incorporated into the GIS database. Prior to any clearing being undertaken outside the Active Mining Area (AMA), an Environmental and Heritage Inspection Notification (EIN) is undertaken to determine whether the proposed disturbance will impact on any Priority flora or conservation significant habitats and if so, whether disturbance impacts can be mitigated. Typically the EIN process incorporates an initial desktop survey to determine known environmental values and avoidance areas within the proposed disturbance area. Following the desktop assessment, a field inspection is undertaken utilising a GPS to identify the following:

- Vegetation type

- Soil type
- Heritage considerations
- Environmental considerations
- Safety considerations.

During the reporting period two EINs were completed within the TGM Development Envelopes (Appendix 6).

- DP1628 – Don Pedro Exploration
- PWSB Bore Drilling

No environmental and heritage values were identified during these EINs which required specific management.

5 Endorsement

This Report has been endorsed by:
Mr Richard McLeod
General Manager
Tropicana Gold Mine
AngloGold Ashanti Australia

I have reviewed this document and accept that the information provided is an accurate account of the activities undertaken during the current reporting period (24 September 2016 to 23 September 2017).

Date:

Richard McLeod
General Manager: Tropicana Gold Mine

FIGURES

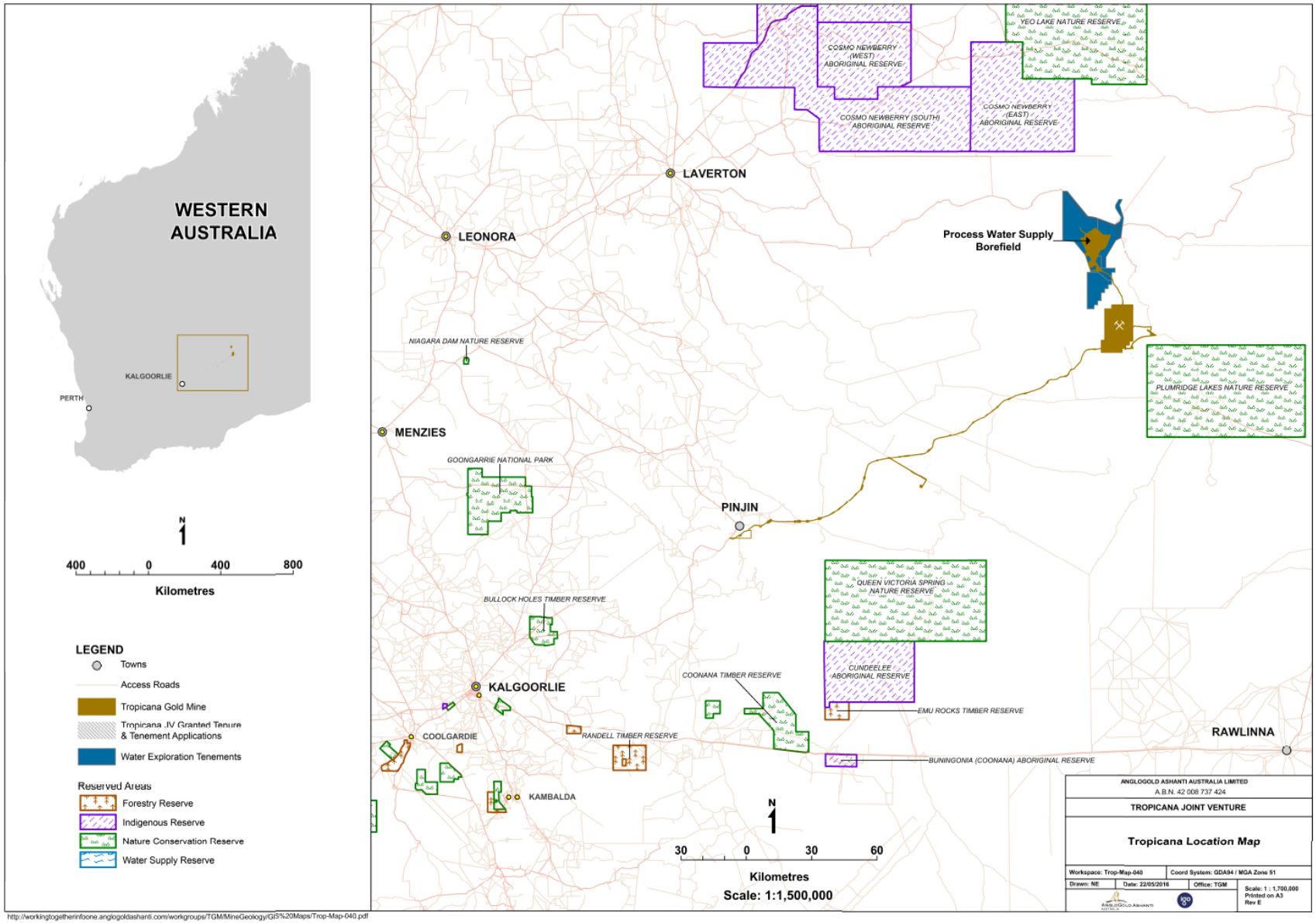

Figure 1: General Location of the Tropicana Gold Mine

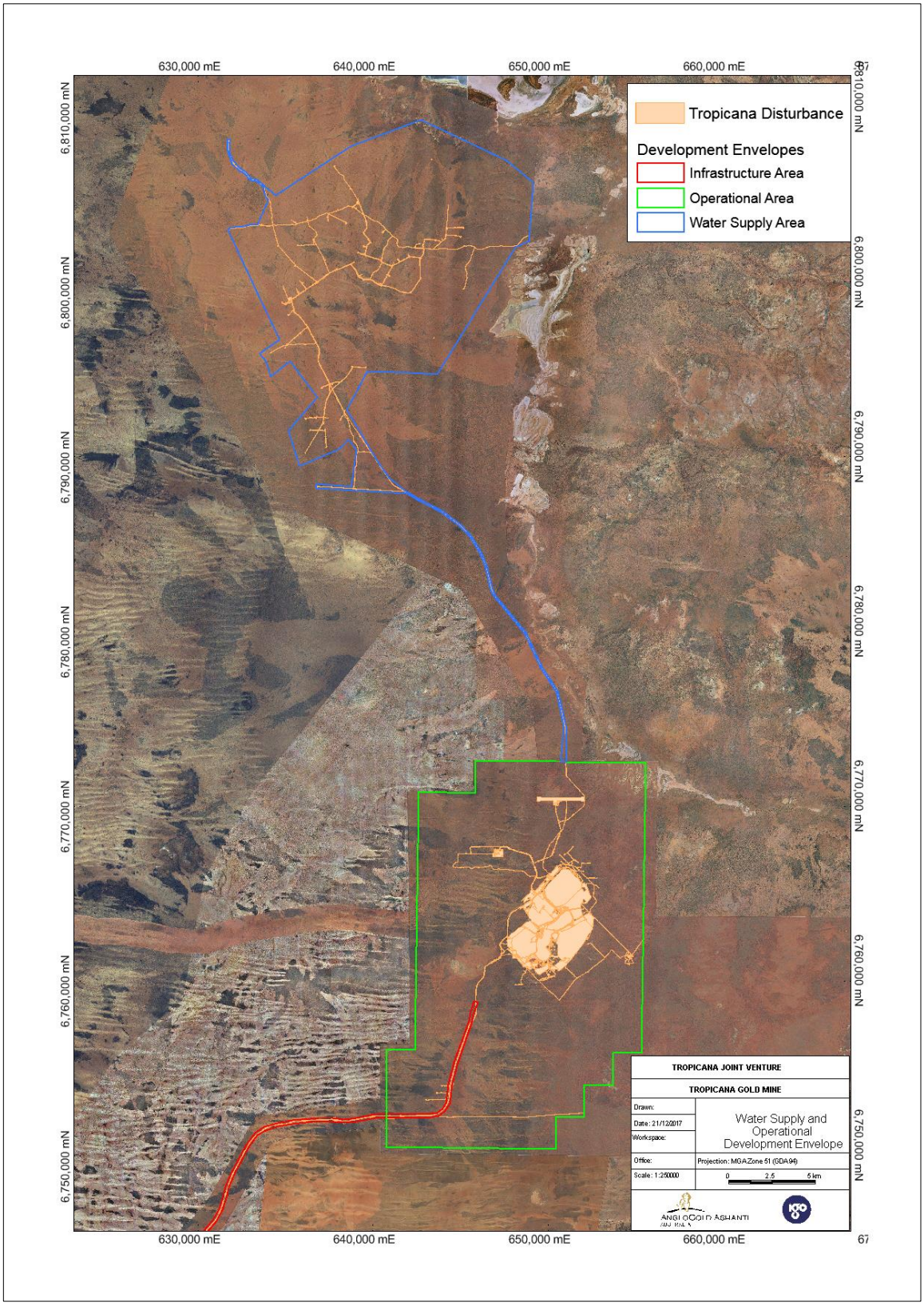

Figure 2: Water Supply and Operational Development Envelopes

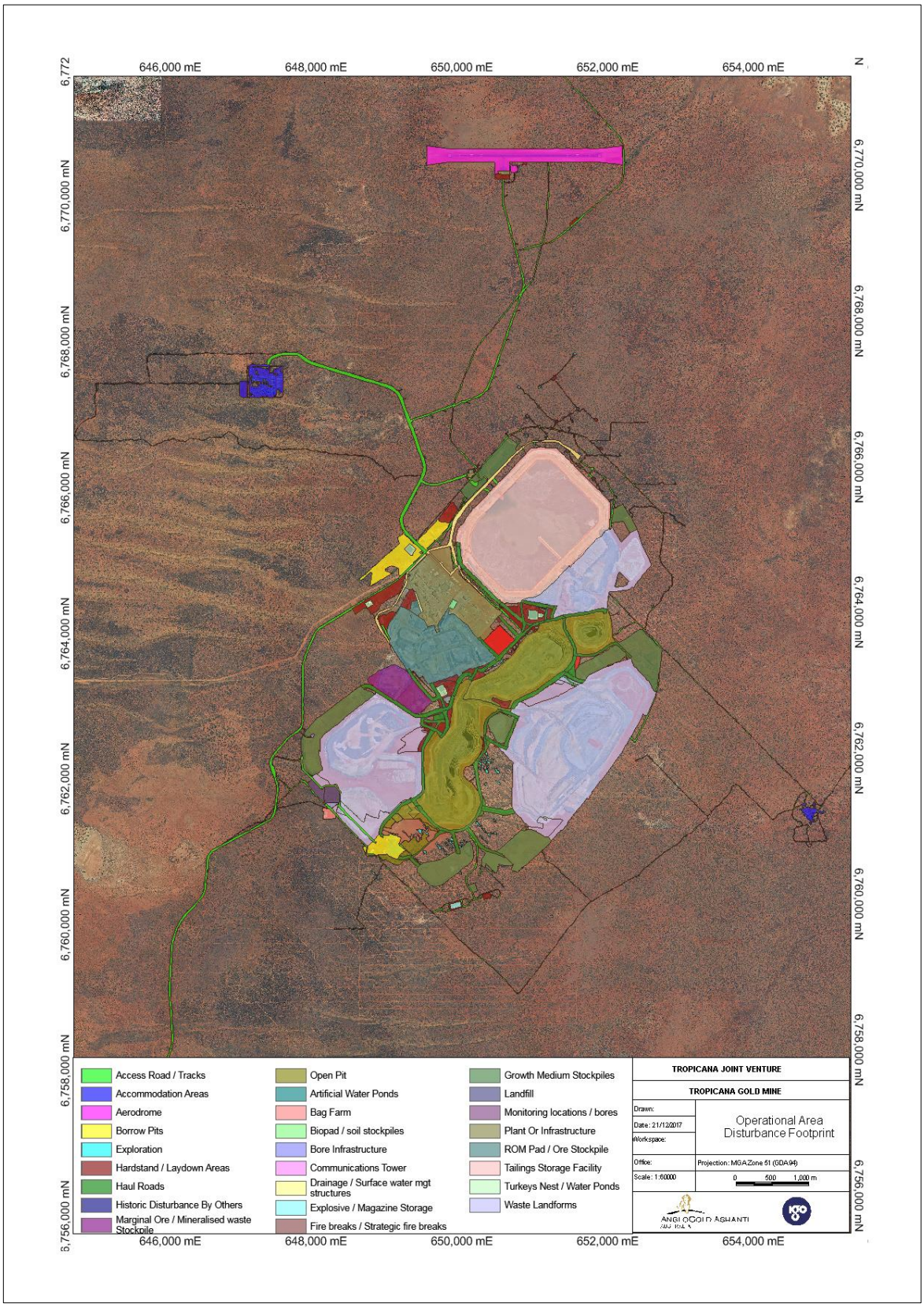

Figure 3: Operational Area Disturbance Footprint

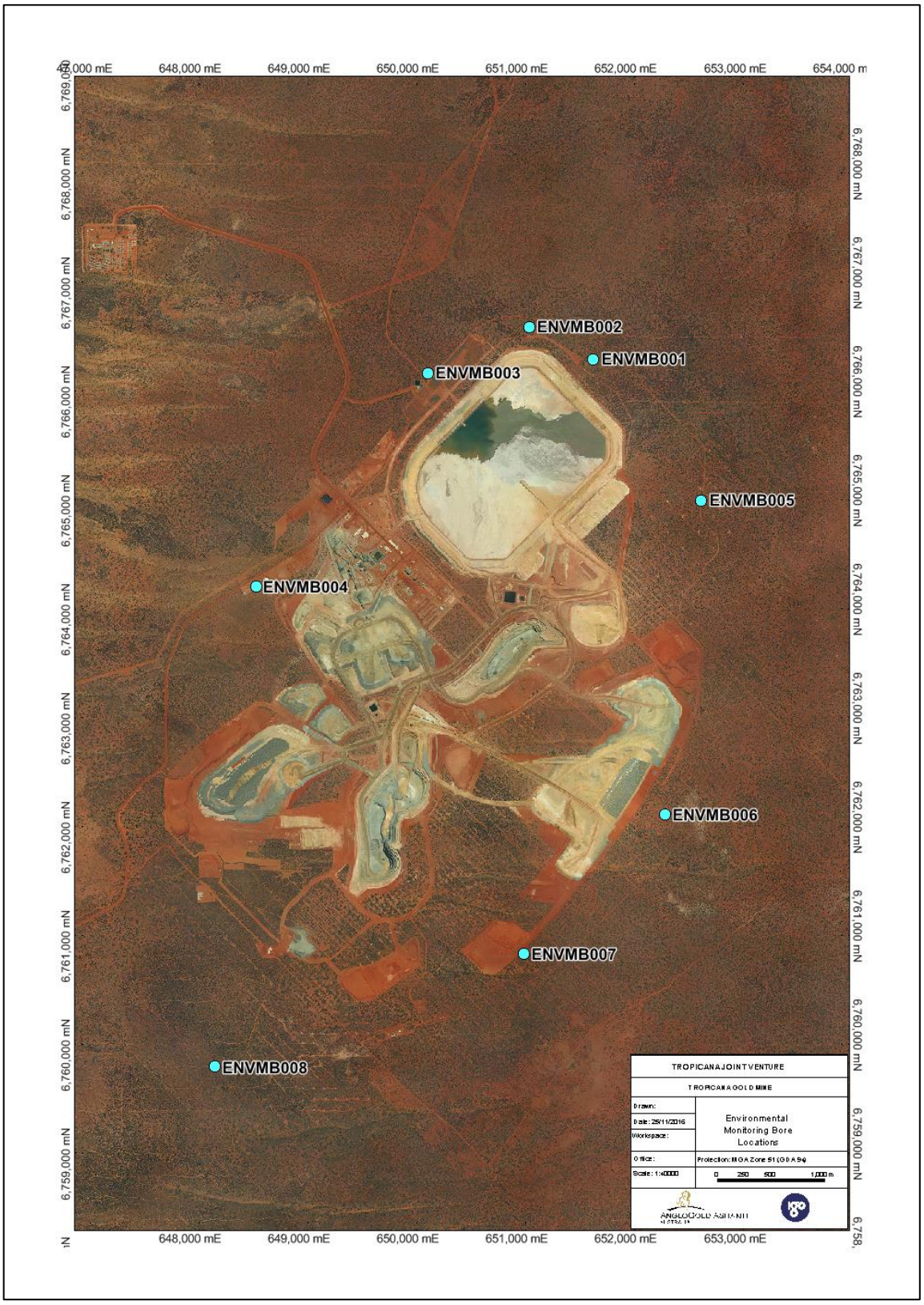

Figure 4: Ministerial Groundwater Monitoring Bore Locations

Figure 5: Surface Water Monitoring Locations

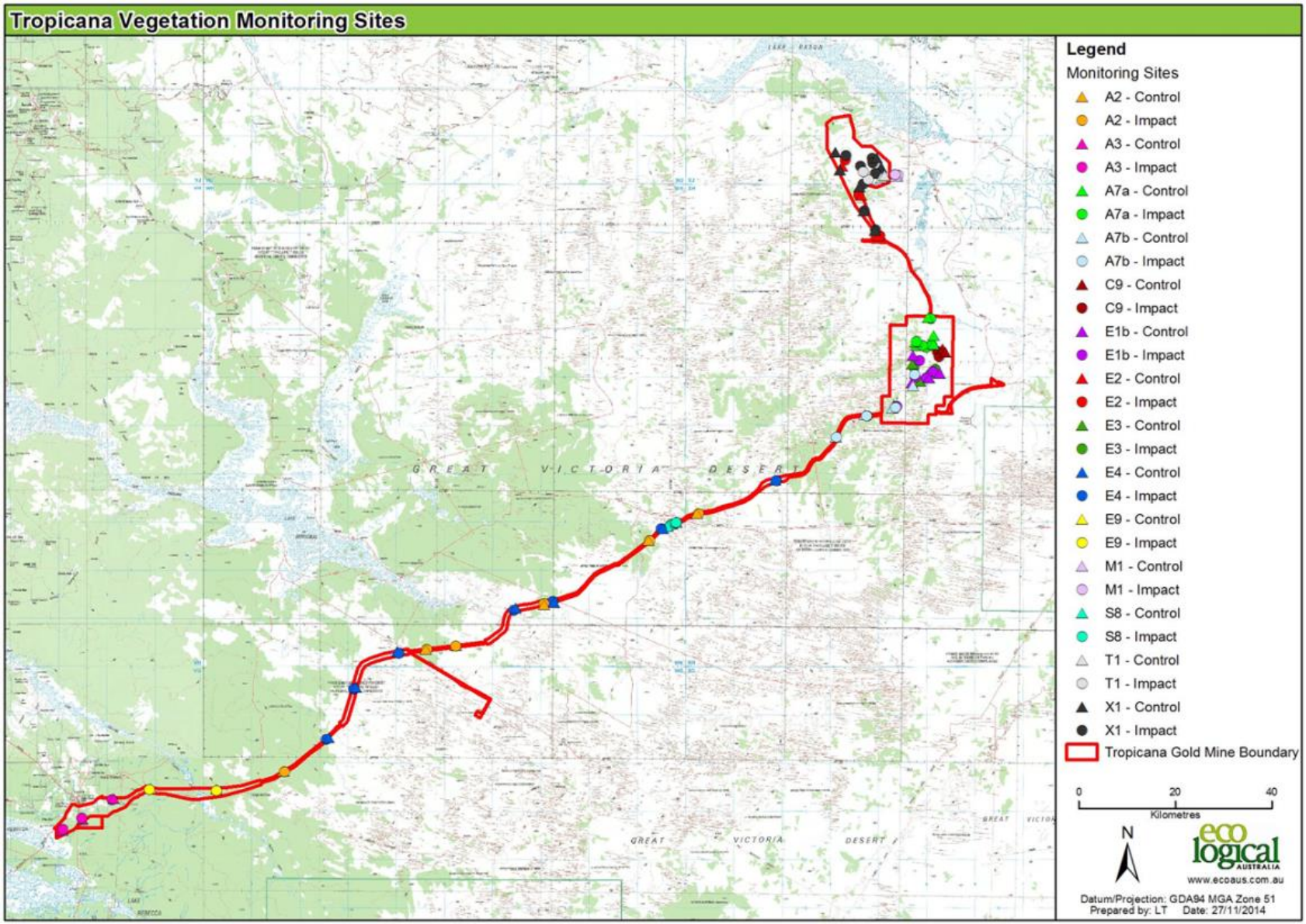

Figure 6: Vegetation condition monitoring quadrat locations (2015)

SITE PHOTOGRAPHS

Plate 1: Photo monitoring of TSF artificial water sources [TSF ART 6B] – Kangaroo (August 2017)

Plate 2: Photo monitoring of TSF artificial water sources [TSF ART 6B] – Emu (September 2017)

Plate 3: Photo monitoring of TSF artificial water sources [TSF ART 5] – Wedge Tailed Eagle (September 2017)

APPENDICES

Appendix 1 – Tropicana Gold Project Ministerial Statement No. 839 Audit Table

Office of the Environmental Protection Authority

GOVERNMENT OF WESTERN AUSTRALIA

AUDIT TABLE

Proposal Implementation Monitoring Section

PROJECT: Tropicana Gold Project, Shire of Menzies, Shire of Laverton and The City of Kalgoorlie-Boulder

Note:

- Phases that apply in this table = **Pre-Construction, Construction, Operation, Decommissioning, Overall (several phases)**
- This audit table is a summary and timetable of conditions and commitments applying to this project. Refer to the Minister's Statement for full detail/precise wording of individual elements.
- Code prefixes: M = Minister's condition; P = Proponent's commitment; A = Audit specification; N = Procedure.
- Any elements with status = "Audited by proponent only" are legally binding but are not required to be addressed specifically in compliance reports, if complied with.
- Acronyms list:- Minister for the Environment - Minister for Environment; Chief Executive Officer – CEO of the OEPA; Department of Environment – DoE (now DEC – Dept of Environment and Conservation); Evaluation Division - Part IV; Pollution Prevention Division - Part V; Waste Management Division - WMD; Department of Conservation and Land Management - CALM; Department of Minerals and Energy - DME; Environmental Protection Authority - EPA; Health Department of WA - HDWA; Water and Rivers Commission - WRC; Bush Fires Board - BFB.

Audit Code	Subject	Action	How	Evidence	Satisfy	Advice	Phase	When	Status 2017	Comment
839:M1.1	**Proposal Implementation**	The proponent shall implement the proposal as assessed by the Environmental Protection Authority and described in Schedule 1 of this statement subject to the condition and procedures of this statement.	As per Schedule 1, Statement 839	Compliance Report	Minister for Environment		Overall	Ongoing	Compliant	Activities undertaken during the reporting period were compliant with Schedule 1 of the Ministerial Statement. As mentioned in the 2016 report an administrative non-compliance associated with the 'Disturbance Areas' key characteristic of Table 1 (Refer to Section 3 of 2016 Compliance Assessment Report (CAR)) was identified and self-reported to the then OEPA. A Section 45C application is currently under assessment by DWER to resolve this issue.
839:M2.1	**Proponent Nomination and Contact Details**	The proponent for the time being nominated by the Minister for Environment under sections 38(6) or 38(7) of the *Environmental Protection Act 1986* is responsible for the implementation of the proposal.	Notify in writing a letter that provides details of the name and address of the new proponent	Letter applying for a transfer of proponent and a copy of the Statement endorsed by the proposed replacement proponent	Minister for Environment		Overall	On going	Compliant	The nominated proponents for the Project did not change during the reporting period.
839:M2.2	**Proponent Nomination and Contact Details**	The proponent shall notify the Chief Executive Officer of the Office of the Environmental Protection Authority of any change of the name and address of the proponent for the serving of notices or other correspondence within 30 days of such change	Notify in writing a letter that provides details of the name and address of the new proponent		CEO		Overall	Within 30 days of such change	Not required at this stage	There was no change to the name and or address of the nominated Proponent during the reporting period.
839:M3.1	**Time Limit of Authorisation**	The authorisation to implement the proposal provided for in this statement shall lapse and be void five years after the date of this statement if the proposal to which this statement relates is not substantially commenced	Notify in Writing	Letter of notification	CEO		Overall	Before the 23 September 2015	Completed	Assessed as 'Completed' by OEPA Desktop Verification Audit May 2014 (CA03-2013-0078).
839:M3.2	**Time Limit of Authorisation**	The proponent shall provide the Chief Executive Officer of the Office of the Environmental Protection Authority with written evidence which demonstrates that the proposal has substantially commenced on or before the expiration of five years from the date of this statement	Notify in Writing	Letter of notification.	CEO		Overall	Before the 23 September 2015	Completed	Assessed as 'Completed' by OEPA Desktop Verification Audit May 2014 (CA03-2013-0078).

AUDIT TABLE

Proposal Implementation Monitoring Section
PROJECT: Tropicana Gold Project, Shire of Menzies, Shire of Laverton and The City of Kalgoorlie-Boulder

839:M4.1	**Compliance Reporting**	The proponent shall prepare and maintain a Compliance Assessment Plan (CAP) to the satisfaction of the Chief Executive Officer of the Office of the Environmental Protection Authority	Correspondence with the OEPA Preparation of a CAP and an audit table in compliance with the requirements of the OEPA.	Approved CAP . A completed and approved Audit Table (this document). Compliance Report	CEO		Overall	Ongoing	Compliant	CAP was prepared and submitted on 13 Dec 2010. No updates have been made during the reporting period. Correspondence from General Manager OEPA on 14 February 2011 indicates OEPA is satisfied that the CAP addresses Condition M4.1
839:M4.2	**Compliance Reporting**	The proponent shall submit to the Chief Executive Officer of the Office of the Environmental Protection Authority, the CAP required by condition 4-1 at least 6 months prior to the first compliance report required by condition 4-6, or prior to ground disturbing activity, whichever is sooner. The CAP shall indicate: 1. the frequency of compliance reporting; 2. the approach and timing of compliance assessments; 3. the retention of compliance assessments; 4. the method of reporting of potential non-compliances and corrective actions taken; 5. the table of contents of compliance reports; and 6. public availability of compliance reports.	The CAP shall indicate: 1. the frequency of compliance reporting; 2. the approach and timing of compliance assessments; 3. the retention of compliance assessments; 4. reporting of potential non-compliances and corrective actions taken; 5. the table of contents of compliance reports; and 6. public availability of compliance reports.	Approved CAP Correspondence with OEPA	CEO		Pre-construction	By 24 June 2011 or prior to ground disturbing activities, whichever is sooner.	Completed	Assessed as 'Completed' by OEPA Desktop Verification Audit May 2014 (CA03-2013-0078). OEPA confirmed the CAP submitted on 13 December 2010 meets the requirements of M4.2 in a letter dated 14 February 2011 (A366869).
839:M4.3	**Compliance Reporting**	The proponent shall assess compliance with conditions in accordance with the CAP required by condition 4-1.	As specified in CAP	Overview provided in Compliance Report	Minister for Environment		Overall	Compliance Report – Annually by 24 December	Compliant	CAR prepared as per CAP and submitted prior to 24 December 2017 as required.
839:M4.4	**Compliance Reporting**	The proponent shall retain reports of all compliance assessments described in the CAP required by condition 4-1 and shall make those reports available when requested by the Chief Executive Officer of the Office of the Environmental Protection Authority	Records and reports will be maintained in accordance with the Proponent's document management system requirements so that they can be retrieved if requested.	Availability at the request of the CEO	CEO		Overall	When requested by the CEO	Compliant	The CAP was submitted to the OEPA on 13 December 2010 and was approved by the OEPA on 14 February 2011. A CAR has been prepared annually since 2011. The 2017 CAR has been submitted prior to 24 December as required. All records and reports are maintained in the AGAA document management system.
839:M4.5	**Compliance Reporting**	The proponent shall advise the Chief Executive Officer of the Office of the Environmental Protection Authority of any potential non-compliance within seven days of that non-compliance being known	Notify in writing	Correspondence to CEO of OEPA	CEO		Overall	Within 7 days of non-compliance being known	Compliant	No non-compliances, which were required to be reported to the DWER in accordance with Condition 4.5, were observed during the reporting period.

AUDIT TABLE

Proposal Implementation Monitoring Section
PROJECT: Tropicana Gold Project, Shire of Menzies, Shire of Laverton and The City of Kalgoorlie-Boulder

839:M4.6	**Compliance Reporting**	The proponent shall submit to the Chief Executive Officer of the Office of the Environmental Protection Authority the first CAR fifteen months from the date of issue of this Statement addressing the twelve month period from the date of issue of this Statement and then annually from the date of submission of the first CAR . The CAR shall: 1. be endorsed by the proponent's Chief Executive Officer or a person delegated to sign on the Chief Executive Officer's behalf; 2. include a statement as to whether the proponent has complied with the conditions; 3. identify all potential non-compliances and describe corrective and preventative actions taken; 4. be made publicly available in accordance with the approved compliance assessment plan; and 5. indicate any proposed changes to the CAP required by condition 4-1.	In accordance with CAP	1. Endorsement in Compliance Report. 2. Compliance Report. 3. Uploaded on to proponent's website and copies sent to DEC Library and PIMB (OEPA).	CEO		Overall	The First CAR submitted due by 24 December 2011. Then annually by 24 December	Compliant	The 2017 CAR will be the seventh annual CAR prepared in accordance with the CAP and has been submitted prior to 24 December as required. Following acceptance of the 2017 CAR by the DWER, the report will be made publicly available on the Tropicana JV website (www.tropicanajv.com.au).
839:M5.1	**Flora and Vegetation**	The proponent shall ensure that there is no loss of plants of Declared Rare Flora species due to construction or operational activities unless otherwise approved.	Implementation and internal audit of DRF management strategies in Section 13 of the Threatened Species and Community Management Strategy (TS&CMS). Implementation and internal audit of Environmental Monitoring Strategy Application for Licence to Take DRF (Regulation 17) where applicable	Species location records, design/location records and any incident reports/logs in monitoring report and summary in Compliance Report Approvals for license to take DRF	Minister for Environment		Overall	Ongoing	Compliant	There is currently no known Declared Rare Flora (DRF) species located within the TGM Project area. *Conospermum toddii* (Victoria Desert Smokebush) was identified within operational area and infrastructure corridor in the baseline surveys and was classified as DRF. Since the baseline surveys, the conservation status of *Conospermum toddii* has been reclassified and downgraded to Priority 4. The Threatened Species and Communities Management Strategy was reviewed in 2017. An updated version has been submitted to the Department of Biodiversity Conservation and Attractions (DBCA) for review on the 8 December 2017. Pre clearing inspections (Environmental Inspection Notifications – EINS) are routinely conducted by the sites Environmental Officers prior to any clearing activities outside of the active mining area (Appendix 6) and internal Ground Disturbance Permits (GDP) are issued for all ground disturbing activities. Examples of GDPs approved during the reporting period are provided in Appendix 8. Records of significant flora and fauna identified in the field are uploaded into the Project GIS.
839:M5.2	**Flora and Vegetation**	The proponent shall undertake monitoring of the condition and abundance of vegetation and flora at reference and potential impact sites in accordance with the "Tropicana Gold Project Environmental Monitoring Strategy, Version: 1.0, Author: B Bastow, Issue Date: 18 February 2010" or subsequent revisions approved by the Chief Executive Officer of the Office of the Environmental Protection Authority. This monitoring is to be carried out to the requirements of the Chief Executive Officer of the Office of the Environmental Protection Authority on advice of the Department of Environment and Conservation	Implementation and internal audit of Environmental Monitoring Strategy Correspondence with OEPA (revisions) and DEC	Monitoring report included in Project Annual Environmental Report (AER) and summary in Compliance Report. Monitoring Records Maps and Photos Correspondence with OEPA (revisions) and DEC	CEO	DEC	Overall	Ongoing	Compliant	The annual vegetation monitoring program was conducted during October 2016. A brief overview of the report findings is provided in the 2017 CAR. A copy of the 2016 Vegetation Monitoring Report is provided as Appendix 9.

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839:M5.3	**Flora and Vegetation**	Should the potential impact sites show a 25 per cent (or greater) decline in cover or productivity as compared to the reference sites, the proponent shall provide a report to the Chief Executive Officer of the Office of the Environmental Protection Authority within 21 days of the decline being identified which 1). describes the decline; 2). provides information which allows determination of the likely root cause of the decline; and 3). if likely to be caused by activities undertaken in implementing the proposal, states the actions and associated timelines proposed to remediate the decline.	Internal audit of monitoring records and analysis of monitoring data Notify in writing	Monitoring Records Report outlining decline, potential causes and corrective actions taken Report to CEO of OEPA	CEO		Overall	Within 21 days of the decline being identified	Compliant	The annual vegetation monitoring was conducted during October 2016 (Appendix 9). Overall the 2016 monitoring program found no deterioration in vegetation condition associated with the project activities. A brief overview of the report findings is provided in Section 4 of the 2017 CAR.
839:M5.4	**Flora and Vegetation**	The proponent shall, on approval of the Chief Executive Officer of the Office of the Environmental Protection Authority, implement the actions identified in 5-3 (3) and continue to implement such actions until the Chief Executive Officer of the Office of the Environmental Protection Authority determines that the remedial actions may cease.	Implement the actions identified in 5-3 (3)	Correspondence with the OEPA	CEO		Overall	On approval of the CEO	Not required at this stage	Overall no impact sites in any of the three core areas required further investigation under Triggers 1 and 2. Trigger 5 was exceeded as weed species were found at sites A3-3 and A3-4. Trigger 6 however did not require investigation as this was the first year weeds have been recorded in the quadrats.
839:M5.5		The proponent shall make the Environmental Monitoring Strategy referred to in 5-2 publically available in a manner approved by the Chief Executive Officer of the Office of the Environmental Protection Authority.	1. In accordance with Proposal Implementation Monitoring Section – Fact Sheet 1 – Draft - Making Documents Publicly Available, unless otherwise instructed by the CEO; 2. Adherence to a condition in a Statement requiring public availability of documents must occur within 14 days of submission of the documents to the CEO; and 3. 14 days from the date of making documents publicly available, proponents shall provide evidence to the CEO to confirm that advertising or lodgement on website has been completed.	Document available on website (and letter to CEO to confirm) Copy of Document to DEC Library and PIMB (OEPA)	CEO		Overall	Ongoing and within 14 days of submission and approval of any revisions	Compliant	The Environmental Monitoring strategy is available on the Tropicana JV website (www.tropicanajv.com.au/sustainability/document library)

839:M6.1	**Threatened Species**	The proponent shall implement the "Tropicana Gold Project Threatened Species and Communities Management Strategy (TS, Version 2.0, Author: B Bastow, Issue Date: July 2009", or subsequent revisions approved by the Chief Executive Officer of the Office of the Environmental Protection Authority. The objective of this strategy is to minimise adverse impacts to conservation significant species and communities.	Implementation and internal audit of DRF management strategies in Section 13 of the Threatened Species and Community Management Strategy (TS&CMS). Internal Audit Correspondence with OEPA (revisions)	Monitoring report included in Project Annual Environmental Report (AER) and summary in Compliance Report. Electronic Species location records Design/location records Site inductions Maps and Photos	CEO		Overall	Ongoing	Compliant	The Threatened Species and Communities Management Strategy (TSCMS) was updated during 2014 and approved by the then DPaW on 30 December 2014. In accordance with Condition 6.2, the TSCMS was reviewed and updated in 2017 and was submitted to DBCA for review on 8 December 2017. An internal compliance audit against the updated Threatened Species and Communities Management Strategy requirements has been conducted (Appendix 7). Pre clearing inspections (Environmental Inspection Notifications – EINs) are routinely conducted by the site Environmental Officers prior to any clearing activities outside the active mining area (Appendix 6) and internal ground disturbance permits (GDP) are issued for all ground disturbing activities. Examples of GDPs approved during the reporting period are provided in Appendix 8. 'Avoidance' and 'Minimise Impact' areas are identified in the Projects GIS and are considered when planning future activities. Updating knowledge of threatened species in the area through additional surveys is ongoing as and when required. An example includes the monitoring survey for trapdoor spiders (Mygalomorphae) undertaken by Phoenix Environmental Services in December 2015.
839:M6.2	**Threatened Species**	The proponent shall review and revise the Tropicana Gold Project Threatened Species and Communities Management Strategy referred to in 6-1, in consultation with the Department of Environment and Conservation, every three years to ensure that the mitigation and management techniques remain valid and incorporate any relevant new research.	Formal review by specialist advisers and DEC	Correspondence with DEC Revised Strategy Research records	Minister for Environment	DEC	Overall	Review and revise every 3 years with the first review due 24 September 2013.	Compliant	The TSCMS was updated during 2014 and approved by the then DPaW on 30 December 2014. The TSCMS was reviewed and updated in 2017 and was submitted to DBCA for review on 8 December 2017. Upon receipt of feedback from DBCA, the 2017 TSCMS will be revised as appropriate and the final version will be uploaded to the Tropicana JV website.

839:M6.3	**Threatened Species**	The proponent shall make the Tropicana Gold Project Threatened Species and Communities Management Strategy referred to in 6-1 publically available in a manner approved by the Chief Executive Officer of the Office of the Environmental Protection Authority.	1. In accordance with Proposal Implementation Monitoring Section – Fact Sheet 1 – Draft - Making Documents Publicly Available, unless otherwise instructed by the CEO; 2. Adherence to a condition in a Statement requiring public availability of documents must occur within 14 days of submission of the documents to the CEO; and 3. 14 days from the date of making documents publicly available, proponents shall provide evidence to the CEO to confirm that advertising or lodgement on website has been completed.	Document available on website (and letter to CEO to confirm) Copy of Document to DEC Library and PIMB (OEPA)	CEO		Overall	Ongoing and within 14 days of submission and approval of revision	Compliant	The most up to date version of the Threatened Species and Communities Management Strategy is available on the Tropicana JV website (www.tropicanajv.com.au/sustainability).
839:M7.1	**Trapped Fauna**	The proponent shall ensure that open trenches associated with construction of the water pipeline and the communications link are cleared of trapped fauna by fauna-rescue personnel at least twice daily. Details of all fauna recovered shall be recorded. The first daily clearing shall take place no later than three hours after sunrise and shall be repeated between the hours of 3:00 pm and 6:00 pm. The open trenches shall also be cleared, and fauna details recorded, by fauna-rescue personnel no more than one hour prior to backfilling of trenches. Note: “fauna-rescue personnel” means an employee of the proponent whose responsibility it is to walk the open trench to recover and record fauna found within the trench.	Internal audit of trench inspection records and procedures	Trench Inspection Fauna Report Trench inspection records Backfilling records Fauna removal and relocation records Fauna injury/mortality records Correspondence with the DEC	Minister for Environment		Construction	Duration of pipeline construction Trench inspection fauna report will be submitted no later than 21 day from the cessation of construction	Completed	Assessed as ‘Completed’ by OEPA Desktop Verification Audit May 2014 (CA03-2013-0078).
839:M7.2	**Trapped Fauna**	The fauna-rescue personnel shall be trained in the following, through a program that meets the requirements of the Chief Executive Officer of the Office of the Environmental Protection Authority: 1. Fauna identification, capture and handling (including venomous snakes); 2. Identification of tracks, scats, burrows and nests of conservation-significant species; 3. Fauna vouchering (of deceased animals); 4. Assessing injured fauna for suitability for release, rehabilitation or euthanasia; 5. Familiarity with the ecology of the species which may be encountered in order to be able to appropriately translocate fauna encountered; and 6. Performing euthanasia.	Training program approved by CEO of OEPA Internal audit of training records	Training Program records Correspondence with the OEPA	CEO		Construction	Program approved prior to the commencement of pipeline construction	Completed	Assessed as ‘Completed’ by OEPA Desktop Verification Audit May 2014 (CA03-2013-0078).

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839:M7.3	**Trapped Fauna**	Open trench lengths shall not exceed a length capable of being inspected and cleared by the fauna-clearing personnel within the required times as set out in condition 7-1.	Internal audit of inspection records Appropriate planning of pipeline construction	Trench Inspection Fauna Report Trench inspection records	Minister for Environment		Construction	During pipeline construction	Completed	Assessed as 'Completed' by OEPA Desktop Verification Audit May 2014 (CA03-2013-0078).
839:M7.4	**Trapped Fauna**	Ramps providing egress points and/or fauna refuges providing suitable shelter from the sun and predators for trapped fauna are to be placed in the trench at intervals not exceeding 50 meters.	Internal audit of inspection records and design drawings	Trench Inspection Fauna Report Trench inspection records Backfilling records Photographs	Minister for Environment		Construction	During pipeline construction	Completed	Assessed as 'Completed' by OEPA Desktop Verification Audit May 2014 (CA03-2013-0078).
839:M7.5	**Trapped Fauna**	The proponent shall produce a report on fauna management within the water pipeline lateral easement and communication corridor at the completion of pipeline and communication link construction. The report shall include the following: 1. details of all fauna inspections; 2. the number of fauna cleared from trenches; 3. fauna mortalities; and 4. all actions taken. The report shall be provided to the Chief Executive Officer of the Office of the Environmental Protection Authority no later than 21 days after the completion of pipeline installation, and shall be made publicly available in a manner approved by the Chief Executive Officer of the Office of the Environmental Protection Authority	1. As per PIMB fact sheet 1 Making documents publicly available. Preparation of report as per criteria following finalisation of pipeline installation and submit to OEPA within 21 days. Report published in a manner approved by CEO of OEPA	Trench Inspection Fauna Report Document available on website (and letter to CEO to confirm) Copy of Document to DEC Library and PIMB (OEPA)	CEO		Overall	Trench inspection fauna report will be submitted no later than 21 days after the completion of pipeline installation	Completed	Assessed as 'Completed' by OEPA Desktop Verification Audit May 2014 (CA03-2013-0078).
839:M8.1	**Groundwater and Surface Water Quality**	The proponent shall ensure that run-off and/or seepage from the tailings storage facility and waste material landforms does not impact the quality of surface water or groundwater within or adjacent to the proposal area to exceed the trigger values for a slightly to moderately disturbed ecosystem provided for in Table 3.4.2 of Chapter 3 of the Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand 2000, *Australian Water Quality Guidelines for Fresh and Marine Waters* and its updates, taking into consideration natural background water quality	Internal audit of water monitoring results against table 3.4.2 of Chapter 3 of *Australian Water Quality Guidelines for Fresh and Marine Waters (2000)* as updated	Monitoring Report included in Project AER and summary included as part of the Compliance Report	Minister for Environment		Overall	Ongoing	Compliant	An internal audit of water monitoring results against the Australia Water Quality Guidelines for Fresh and Marine Waters (2000) was conducted in the 2014 CAR. The 2014 internal audit found that: • Tropicana baseline data naturally exceeds a number of Guideline trigger values and/or the Guideline trigger values are too low to be detected by the NATA accredited laboratory utilised by TGM for water analysis. • The Guidelines were developed for fresh and marine waters. The groundwater surrounding TGM does not align with either fresh or marine waters, with water quality ranging from saline to hypersaline. The 2014 Internal Audit established site specific triggers for groundwater quality based on baseline data. Groundwater monitoring bores around the TSF and waste landforms have been sampled throughout the reporting period. Review and analysis of the groundwater monitoring results identifies minor and localised variations to the baseline values however, there is no observed detrimental impact to the receiving environment. As noted in the EPA Report 1361, there is limited beneficial users of groundwater in the vicinity of the Project. The detailed review is provided in Appendix 3. The objective of Condition 8-1, as per EPA Report 1361, "to ensure that any discharge of water from the TSF and waste material landforms is monitored, managed and treated if necessary to

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										ensure that surface and groundwater quality are maintained". is being achieved: • Monitored – AGAA undertakes a comprehensive groundwater monitoring programme to enable identification of potential impacts to groundwater quality (Appendix 3). • Managed – AGAA have implemented a TSF seepage recovery borefield to mitigate any impacts to the groundwater regime. • Treated – seepage abstraction by the recovery borefield facilitates the removal of potential contaminates from the groundwater environment. Abstracted groundwater is returned to the Raw Water Pond for use in the Processing Plant. Opportunistic surface water monitoring has been conducted following rainfall events greater than 20 mm in 24 hours (Appendix 4).
839:M8.2	**Groundwater and Surface Water Quality**	The proponent shall monitor the quality of surface water and groundwater upstream and downstream of the tailings storage facility and waste material landforms to ensure that the requirements of condition 8-1 are met. This monitoring is to be carried out using methods consistent with Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand 2000, *Australian Guidelines for Water Quality Monitoring and Reporting* (and its updates) and to the satisfaction of the Chief Executive Officer of the Office of the Environmental Protection Authority.	Implementation of Environmental Monitoring Strategy Internal audit of water monitoring methodology against *Australian Guidelines for Water Quality Monitoring and Reporting* (2000) and its updates	Monitoring report included in Project AER and Summary included in Compliance Report	CEO		Overall	Ongoing	Compliant	Groundwater monitoring bores around the TSF and waste landforms have been sampled throughout the reporting period (Appendix 3). Opportunistic surface water monitoring has been conducted following rainfall events greater than 20 mm in 24 hours (Appendix 4). An internal audit of the monitoring methodology against the Australian Guidelines for Water Quality Monitoring and Reporting (2000) was undertaken (Appendix 5).
839:M8.3	**Groundwater and Surface Water Quality**	The proponent shall commence the water quality monitoring required by 8-2 before ground disturbing activities in order to collect baseline data	Implementation of Environmental Monitoring Strategy Internal audit of groundwater and surface water monitoring program	Monitoring report included in Project AER and Summary included in Compliance Report	CEO		Pre-construction	Before ground disturbing activities.	Compliant / Completed	Following review of the 2013 TGM CAR the OEPA advised in a letter dated 5 June 2014 (OEPA Ref CA01-2013-0078/2014-0000827594) that AGAA was considered to be compliant with MS839 Condition 8.3. As the collection of baseline data was a pre-construction phase activity and AGAA was assessed by the OEPA to be compliant with MS839 Condition 8.3 in 2014, AGAA considers the status of Condition 8.3 to be 'Completed'.
839:M8.4	**Groundwater and Surface Water Quality**	The proponent shall submit annually the results of monitoring required by condition 8-2 to the Chief Executive Officer of the Office of the Environmental Protection Authority	Written submission of results within the annual compliance reports	Correspondence with OEPA Monitoring report included in Project AER and Summary included in Compliance Report	CEO		Overall	Compliance Report – Annually by 24 December	Compliant	A summary of water monitoring results is provided in the 2017 CAR (Appendix 3 and Appendix 4). Results of the water quality monitoring activities are also provided to the Department of Mines, Industry Regulation and Safety (DMIRS) through the Annual Environmental Report (AER) in January each year.
839:M8.5	**Groundwater and Surface Water Quality**	In the event that monitoring required by condition 8-2 indicates that the requirements of condition 8-1 are not being met, the proponent shall: 1. report such findings to the Chief Executive Officer of the Office of the Environmental Protection Authority within 21 days of the decline in water quality being identified; 2. provide evidence which allows determination of the root cause of the decline in water quality; and 3. if determined to be a result of activities undertaken in implementing the proposal, state	Preparation of report as per criteria and submit to OEPA within 21 days. Internal review of monitoring results against criteria outlined in condition 8.1	Report outlining the water quality change, potential causes and corrective actions taken	CEO		Overall	No later than 21 days of the decline in water quality being identified.	Not Required	The requirements of Condition 8.1 have been met – refer to Condition 8.1.

		the actions and associated timelines proposed to be taken to remediate the water quality.								
839:M8.6	**Groundwater and Surface Water Quality**	The proponent shall, on approval of the Chief Executive Officer of the Office of the Environmental Protection Authority, implement the actions identified in 8-5 (3) and continue to implement such actions until the Chief Executive Officer of the Office of the Environmental Protection Authority determines that the remedial actions may cease.	Implement the actions identified in 8-5 (3)	Correspondence with OEPA	CEO		Overall	On approval of the CEO	Not Required	A summary of water monitoring results is provided in the 2016 CAR (Appendix 3 and Appendix 4).
839:M8.7	**Groundwater and Surface Water Quality**	The proponent shall make the monitoring reports required by condition 8-2 publicly available in a manner approved by the Chief Executive Officer of the Office of the Environmental Protection Authority	1. In accordance with Proposal Implementation Monitoring Section – Fact Sheet 1 – Draft - Making Documents Publicly Available, unless otherwise instructed by the CEO; 2. Adherence to a condition in a Statement requiring public availability of documents must occur within 14 days of submission of the documents to the CEO; and 3. 14 days from the date of making documents publicly available, proponents shall provide evidence to the CEO to confirm that advertising or lodgement on website has been completed. In accordance with CAP	Document available on website (and letter to CEO to confirm) Copy of Document to DEC Library and PIMB (OEPA)	CEO		Overall	Within 14 days of submission	Compliant	Following acceptance of the 2017 CAR by the OEPA, the report, including monitoring results contained in Appendix 3 and 4, will be made publicly available on the Tropicana JV website (www.tropicanajv.com.au)
839:M9.1	**Rehabilitation**	The proponent shall undertake progressive rehabilitation over the life of the proposal to achieve the following outcomes: 1. The waste material landforms and tailings storage facility shall be non-polluting and shall be constructed so that their stability, surface drainage, resistance to erosion and ability to support local native vegetation are similar to undisturbed natural analogue landforms as demonstrated by Ecosystem Function Analysis or other methodology acceptable to the Chief Executive Officer of the Office of the Environmental Protection Authority. 2. Waste material landforms, tailings storage facility and other areas disturbed through implementation of the proposal (excluding mine pits), shall be progressively rehabilitated with vegetation composed of native plant species of local provenance (defined as seed or plant material collected within the Great Victoria Desert Bioregions 1 and 2). 3. The percentage cover and species diversity of living self-sustaining native vegetation in all rehabilitation areas shall be comparable to that of undisturbed natural analogue sites as demonstrated by Ecosystem Function Analysis or other methodology acceptable to the Chief Executive Officer of the Office of the Environmental Protection Authority. 4. No new species of weeds (including both declared weeds and environmental weeds) shall establish in the area as a result of the implementation of the proposal. 5. The coverage of weeds (including both declared weeds and environmental weeds) within rehabilitated areas shall be no greater than the average of three reference sites on	Implementation of Operational Management Strategy, Tailings Environmental Management Strategy and Conceptual Closure and Rehabilitation Management Strategy (and approved future revisions) Internal audit of rehabilitation and closure activities and records Correspondence with OEPA and DEC on Monitoring Strategy Analysis of monitoring data	Rehabilitation Records Annual Mine Plan Map and photos of rehabilitation Rehabilitation Monitoring Records	CEO	DEC	Overall	Ongoing	Compliant	A total of 101.1 ha of rehabilitation has been completed to date. Due to active mining activities and operational usage, limited areas are currently available for progressive rehabilitation, including waste landforms and TSF. An update on rehabilitation activities undertaken during the reporting period is provided in Appendix 2. As progressive rehabilitation of waste landforms or the TSF has not yet been undertaken, there is no requirement to monitor the rehabilitation success on these landforms. The TGM Mine Closure Plan was revised and updated in 2016/2017 in accordance with the 'Guidelines for Preparing Mines Closure Plans' (May 2015) and submitted to DMIRS in February 2017. Reference sites to monitor the coverage of weeds within rehabilitated areas have not yet been established. AGAA has not yet commenced formal rehabilitation monitoring due to the minimal progressive rehabilitation completed during the life of mine to date and the need to conduct further research to determine the most appropriate methodology to monitor rehabilitation success at TGM.

		nearby land, with the reference sites to be chosen in consultation with the Department of Environment and Conservation. Note: The methodology for Ecosystem Function Analysis is set out in Tongway DJ and Hindley 2004 *LandsCAP e Function Analysis – Procedures for Monitoring and Assessing LandsCAP es*, Commonwealth Scientific and Industrial Research Organisation Sustainable Ecosystems, Canberra.								
839:M9.2	**Rehabilitation**	Rehabilitation activities shall continue until such time as the requirements of condition 9-1 are met, and are demonstrated by inspections and reports to be met, for a minimum of five years following mine completion to the satisfaction of the Chief Executive Officer of the Office of the Environmental Protection Authority, on advice of the Department of Mines and Petroleum	Activities will continue until the M9.1 requirements are met for a minimum of 5 years Seek advice from DMP following mine completion.	Rehabilitation records Rehabilitation Monitoring Records Correspondence with OEPA and DMP	CEO	DMP	Overall	Ongoing until the requirements of M9-1 are met for a minimum of 5 years	Compliant	TGM is in early stage of operations and final landforms are not yet available for rehabilitation to commence. Rehabilitation activities will be conducted progressively as and when areas become available.
839:M10.1	**Final Closure and Decommissioning Plan**	At least five years prior to mine completion, the proponent shall prepare and submit a Final Closure and Decommissioning Plan to the requirements of the Chief Executive Officer of the Office of the Environmental Protection Authority, on advice of the Department of Mines and Petroleum	Preparation of a Final Closure and Decommissioning Plan in accordance with criteria.	Correspondence with OEPA approving the Plan	CEO	DMP	Overall	At least five years prior to mine completion	Not required at this stage	The TGM Mine Closure Plan was revised and updated in 2016/2017 in accordance with the 'Guidelines for Preparing Mines Closure Plans' (May 2015) and submitted to DMIRS in February 2017. TGM is in early stage of operations and has an expected mine life of 10-15 years. A final mine closure plan will be developed 5 years prior to mine completion as required.
839:M10.2	**Final Closure and Decommissioning Plan**	The Final Closure and Decommissioning Plan shall be prepared consistent with: 1. ANZMEC/MCA 2000, *Strategic Framework for Mine Closure Planning*; and 2. Department of Industry Tourism and Resources 2006 *Mine Closure and Completion* (Leading Practice Sustainable Development Program for the Mining Industry), Commonwealth Government, Canberra;	Preparation of a Final Closure and Decommissioning Plan in accordance with criteria.	Submit plan to CEO of OEPA and DMP Approval of Plan by OEPA.	CEO	DMP	Overall	At least five years prior to mine completion	Not required at this stage	The TGM Mine Closure Plan was revised and updated in 2016/2017 in accordance with the 'Guidelines for Preparing Mines Closure Plans' (May 2015) and submitted to DMIRS in February 2017. TGM is in early stage of operations and has an expected mine life of 10-15 years. A final mine closure plan will be developed 5 years prior to mine completion as required.
839:M10.3	**Final Closure and Decommissioning Plan**	The Final Closure and Decommissioning Plan shall provide detailed technical information on the following: 1. final closure of all areas disturbed through implementation of the proposal so that they are safe, stable and non-polluting; 2. decommissioning of all plant and equipment; 3. disposal of waste materials; 4. final rehabilitation of waste dumps; tailings storage facilities and other areas (outside the mine pit(s)); 5. Management and monitoring following mine completion; and 6.inventory of all contaminated sites and proposed management.	Preparation of a Final Closure and Decommissioning Plan in accordance with criteria.	Submit plan to CEO of OEPA and DMP. Approval of the plan by OEPA.	CEO	DMP	Overall	At least five years prior to mine completion	Not required at this stage	A mine closure plan was prepared in accordance with the requirements of the 'Guidelines for Preparation of a Mine Closure Plan' (June 2011) was submitted to DMP in January 2013. An updated Mine Closure Plan will be submitted to DMP in January 2017. TGM is in early stage of operations and has an expected mine life of 10-15 years. A final mine closure plan will be developed 5 years prior to mine completion as required.
839:M10.4	**Final Closure and Decommissioning Plan**	The proponent shall close, decommission and rehabilitate the proposal in accordance with the approved Final Closure and Decommissioning Plan	Implementation of the Final Closure and Decommissioning Plan Internal and external audits (as required) of the Final Closure and Decommissioning Plan.	Closure, rehabilitation and Decommissioning activities detailed in the Project AER and summary included in Compliance Report	Minister for Environment		Overall	Ongoing	Not required at this stage	TGM is in early stage of operations and has an expected mine life of 10-15 years.

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839:M10.5	**Final Closure and Decommissioning Plan**	The proponent shall make the Final Closure and Decommissioning Plan required by conditions 10-1 and 10-2 publicly available in a manner approved by the Chief Executive Officer of the Office of the Environmental Protection Authority	1. In accordance with Proposal Implementation Monitoring Section – Fact Sheet 1 – Draft - Making Documents Publicly Available, unless otherwise instructed by the CEO; 2. Adherence to a condition in a Statement requiring public availability of documents must occur within 14 days of submission of the documents to the CEO; and 3. 14 days from the date of making documents publicly available, proponents shall provide evidence to the CEO to confirm that advertising or lodgement on website has been completed.	Document available on website (and letter to CEO to confirm) Copy of Document to DEC Library and PIMB (OEPA)	CEO		Overall	Within 14 days of submission	Not required at this stage.	TGM is in early stage of operations and has an expected mine life of 10-15 years.

Appendix 2: Rehabilitation Summary

MEMORANDUM

Date: **11 November 2017**

To: Environment Team (Safety & Environment Department)

From: Sarah Brown

Subject: 2017 Rehabilitation Summary

1 Rehabilitation Activities

A total of 101.1 ha of rehabilitation has been completed for TGM.

Table 1: Summary of rehabilitation completed for TGM

Disturbance Category	Rehabilitation (ha)
Access Roads / Tracks	0.423
Borrow Pit	83.49
Camp Site	11.39
Turkeys Nest	5.79
TOTAL	**101.1**

1.1 Reporting Period

Due to ongoing active mining and operational activities, limited areas were available for progressive rehabilitation during the reporting period. Although limited on-ground rehabilitation activities were undertaken, key rehabilitation achievements completed during the reporting period included:

- Review and update of the TGM Mine Closure Plan and submission to the Department of Mines, Industry Regulation and Safety (DMIRS) in February 2017.
- Review and update of the financial provisioning for mine closure.
- Seed collection around TGM. Collected seed is stored off site with an accredited seed collector in climate controlled facilities located in Mt Barker.

1.2 Previous Rehabilitation

During 2012-2013, borrow pits, turkeys nests and related infrastructure along the Pinjin Access Road corridor which was not required for future road maintenance activities were rehabilitated. Rehabilitation along the Access Road constitutes the majority of progressive rehabilitation completed for TGM to date.

Waste landform rehabilitation trials were commenced in 2015. Rehabilitation trials on LWE and LEA involved re-profiling waste landforms to 15 degrees and placement of growth medium up to one metre thick.

In 2015, seedling propagation by the Kalgoorlie Boulder Urban Landcare Group (KBULG) utilising seed collected around TGM were planted in work areas and around the village, rolled out to employees as an adopt a tree program.

2 Waste Landform Rehabilitation Design

During the previous 2016 reporting period, extensive work on materials characterisation and erosion modelling was undertaken to determine the TGM waste landform rehabilitation strategy. The strategy has been developed to create a safe, stable and functioning landform which is consistent with the surrounding landscape. The strategy identifies actions to increase the resilience of the slopes against erosion and sediment management and is cognisant of ensuring a buildable design utilising the existing mine fleet.

Based on the outcomes of material characterisation and erosion modelling, the key aspects of the waste landform rehabilitation strategy proposed to be implemented at TGM are:

- Batter and Berm
  A 20 m wide berm, back sloped at 5 degrees with the capacity to withstand a 1 in 100 year storm event will be incorporated into the landform slope profile. Erosion modelling demonstrated that a 10 m berm would have sufficient capacity to withstand a 1 in 100 year storm event – the adoption of a 20 m wide berm further reduces the risk of erosion potential on the waste landform slopes.

  The 20 m berm achieves a key aim of the rehabilitation strategy of demonstrating an achievable and buildable design based on the existing mining fleet. The 20 m berm provides for access by the existing mine fleet to the mid-slope of the batter profile, enabling progressive rehabilitation and cost-effective placement of rehabilitation materials.

- 15 degree slope profile
  The adoption of a final slope profile of 15^0 delivers waste landform slope profiles at comparable angles to local sand dunes. Erosion modelling shows that the Growth Medium Sand and Caprock materials are stable over slope angles approaching 22 degrees (or 40%). Implementation of a 15^0 slope profile provides additional erosion risk reduction for the waste landform design and supports the buildable rehabilitation design strategy.

- Cover Material
  To guard against wind erosion, it is proposed to use a 1 m layer of Growth Medium Sand (GMS): Caprock mixture at a ratio of 1:3 for the top section of each landform batter. The dominant Caprock will prevent wind erosion, particularly on the windward (eastern) side of landforms. Below the GMS/Caprock mixture will be a 1 m layer section of GMS incorporating available vegetative material (VMS), with available VMS preferentially placed on the prevailing wind side of the landform. The vegetative debris in the VSM will also guard against wind erosion whilst providing a medium to trap resources such as seed, water and organic matter. The bottom (and least susceptible) of the waste landform sections will be comprised of GMS. Therefore the entire surface area of batters will comprise cover material with high infiltration rates and the upper sections of each batter protected against wind erosion.

  The 20 m berms and top surface of the waste landforms will use Growth Medium Gravel (GMG) as the cover material. GMG has a high slit and clay faction resulting in a high water holding capacity and plant available water content which will support revegetation, providing a niche for deeper rooted vegetation to establish.

- Surface Water Management

  Erosion modelling clearly shows that GMS and Caprock yield negligible surface water run-off and sediment loss across all modelled landform designs. As a risk reduction strategy, waste landforms will have sediment run-off containment structures (e.g. toe-bunds and/or containment cells) constructed at the toe of slopes to prevent runoff and sediment being released directly to the environment.

  Cell bunds will be installed on the top of the waste landform and/or berms at strategic points where a post-construction survey pick-up indicates the potential for concentration of water flow.

  A substantial crestal bund will be established at the top of the waste landform (at least 2 m high and the width of a dump truck) to minimise the risk of the top surface contributing runoff to batters. The crestal bund will be thoroughly compacted and contiguous with the outer batter profile, having the same treatments applied to it as the batter profile.

  The upper section batters comprising the 1:3 mixture of GMS:Caprock will be contour ripped to assist in the erosion control through promoting infiltration and reducing the velocity of any runoff which may occur. The upper surface of the waste landform will also be ripped to reduce compaction, promote infiltration and trap resources (i.e. water, seed, organic matter) to promote revegetation.

- Revegetation

  Revegetation of waste landforms will be achieved by application of local provenance seed mixes tailored to the specific growth mediums applied to the landform. The application of a one metre cover layer seeks to provide a sufficient depth of growth medium to increase the amount of plant available water and reflects the typical depth of vegetation root zones in the arid area. Further research will be undertaken to assess and validate the optimal depth of cover for the growth mediums available.

  Baseline vegetation community studies indicate that the vegetation communities and flora species located within the TGM disturbance footprint. These vegetation communities were supported by the underlying growth medium/s which were / are stockpiled for use in rehabilitation. These vegetation communities and flora species will provide a guide as to the tailored seed mixes to be established for waste landform rehabilitation.

Further details on the waste landform rehabilitation strategy, materials characterisation and erosion modelling are contained in the 'Operational Area Waste Landform Section 45C – October 2016', application submitted to the OEPA in October 2016.

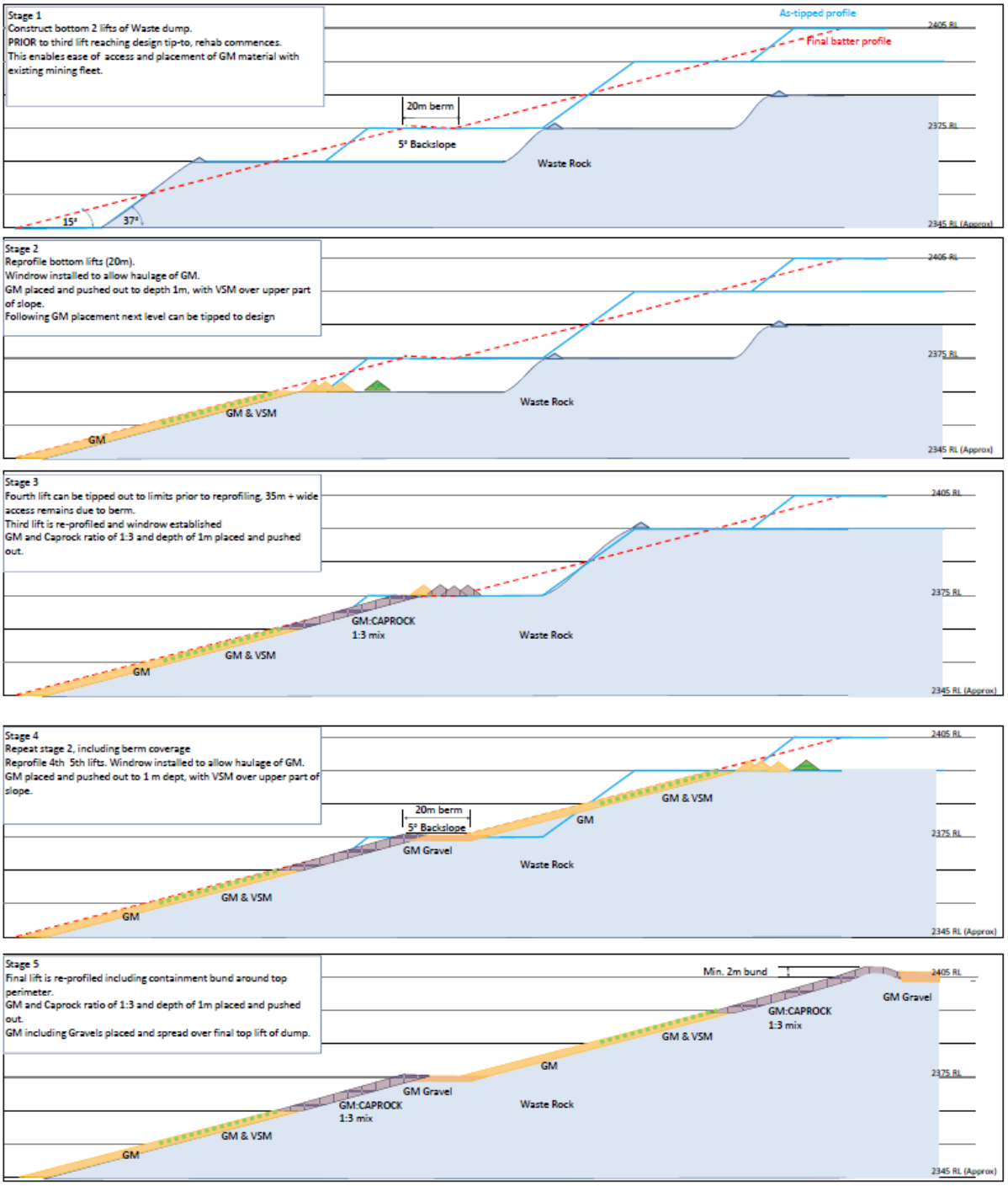


Figure 1: Evolution of waste landform rehabilitation from construction to completion.

3 Mine Closure Plan

The TGM Mine Closure Plan (MCP) was revised and updated during the reporting period in accordance with the "Guidelines for Preparing Mine Closure Plans" (May 2015) and submitted to DMIRS in February 2017.

The 2017 MCP incorporated updated information on:

- Materials characterisation and erosion modelling.
- Waste Landform Rehabilitation Strategy.
- Post-mining Landuse.
- Stakeholder Engagement.
- Materials Balance.
- Knowledge gaps for each domain and or feature, and the risks associated with not having the information available. A list of research, investigations and trials required to close the knowledge gaps and the tasks prioritised based on the risk.

Appendix 3: Groundwater Monitoring

MEMORANDUM

Date: **1 December 2017**

To: Environment Team

From: Sarah Brown

Subject: 2016/2017 Groundwater Monitoring Results

Tropicana Gold Mine Groundwater Trigger Values

Ministerial Statement 839 (MS839) Condition 8-1 requires that:
"The proponent shall ensure that run-off and/or seepage from the tailings storage facility and waste material landforms does not impact the quality of surface water or groundwater within or adjacent to the proposal area to exceed the trigger values for a slightly to moderately disturbed ecosystem provided for in Table 3.4.2 of Chapter 3 of the Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand 2000, *Australian Water Quality Guidelines for Fresh and Marine Waters* and its updates, taking into consideration natural background water quality".

In 2014 an internal review/audit by AGAA of the *Australian and New Zealand Environment Guidelines for Fresh and Marine Water Quality* (the Guidelines), specifically Tables 3.4.1 and Table 3.4.2, against results obtained from the Tropicana Gold Mine (TGM) environmental groundwater monitoring bores was undertaken. The review included the compilation of baseline monitoring data collected since the Environmental Monitoring Bores (ENVMB001 to ENVMB008) were installed (October 2013 – November 2014).

A review of the baseline data against the Guidelines trigger values for a slightly to moderately disturbed ecosystem (95% protection level) found that the Tropicana baseline data naturally exceeds a number of the Guidelines trigger values and/or the Guidelines trigger values are too low to be detected by the NATA accredited laboratory engaged by TGM for water analysis. For example, Aluminium has been consistently recorded across the environmental monitoring bores by the laboratory as <0.1 milligrams per litre (mg/L), while the guideline value is 0.055 mg/L. Furthermore, the Guidelines were developed specifically for fresh and marine waters. The groundwater surrounding the TGM does not align with either fresh or marine waters, with Tropicana water quality ranging from saline to hypersaline (TDS ranging from 9,000 mg/L to 42,000 mg/L).

The intent of the Guidelines is to specify biological, water and sediment quality guidelines for protecting a range of aquatic ecosystems from fresh water to marine. The Guidelines state that they are not sufficient in themselves to protect ecosystem integrity; and that they must be used in the context of the local environmental condition and other important environmental factors. The guidelines should be applied to maintain ecosystems and protect from degradation. In accordance with the Guidelines, site specific baselines values have been established for TGM based on ground water monitoring undertaken between October 2013 to November 2014, and site specific triggers have been developed to enable water quality changes to be identified. Triggers have been developed for each parameter to allow a 10% variation in baseline ground water quality monitoring, as per the TGM Environmental Monitoring Strategy and the Guidelines. Therefore, although the triggers presented in the Guidelines are not considered relevant for TGM, the intent of the Guidelines has been adopted and implemented on site.

The adopted triggers are consistent with MS839 Condition 8-1 as they “take into consideration natural background water quality”.

2016/2017 Groundwater Quality Results

An internal review of the groundwater monitoring data for the reporting period (1 October 2016 to 30 September 2017) was undertaken for Environmental Monitoring Bores (ENVMB001 to ENVMB008) against the water quality trigger values (established in 2014). The frequency of monitoring of the Environmental Monitoring Bores was reviewed in January 2017 and the following changes were made:;

- Electrical Conductivity, pH, Total Dissolved Solids and WAD Cyanide are sampled monthly;
- All other parameters are sampled on a quarterly basis starting February 2017.

Unfortunately, as a result of an annual review of monitoring suites Copper (Cu) had inadvertently been removed from the standard Chain of Custody (CoC) form. Copper was sampled for October, November and December 2016 as part of the groundwater monitoring campaign. This issue has now been rectified and will be included in all monitoring going forward.

A map of the Environmental Monitoring Bore locations is provided in Figure 1.

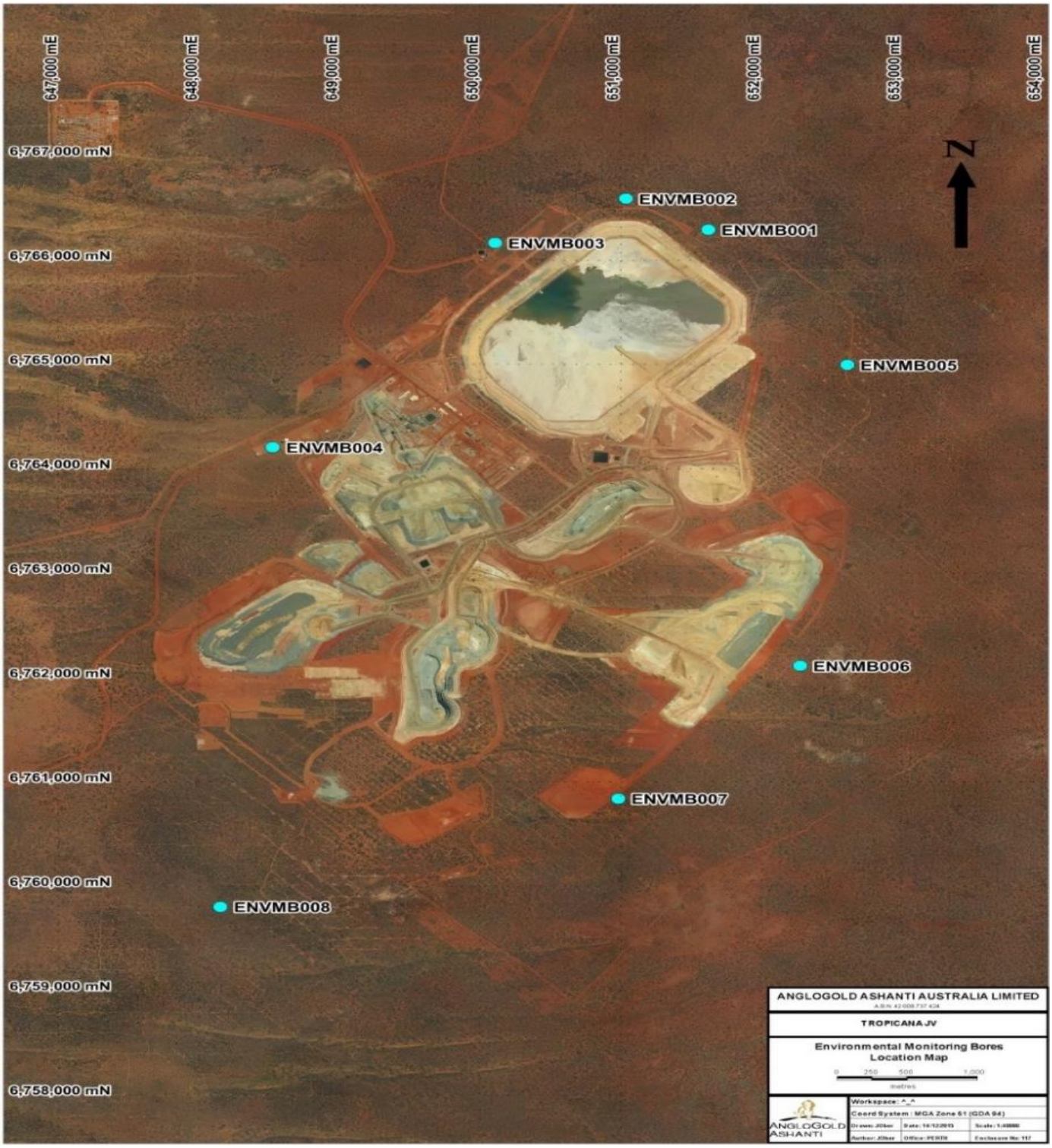


Figure 1: Environmental Monitoring Bore Locations (ENVMB001 – ENVMB008)

Results for pH (Figure 2) were relatively stable across the reporting period, with pH units ranging between 7.2 (ENVMB001) and 8.2 (ENVMB002). No trigger values were exceeded for pH monitoring results.

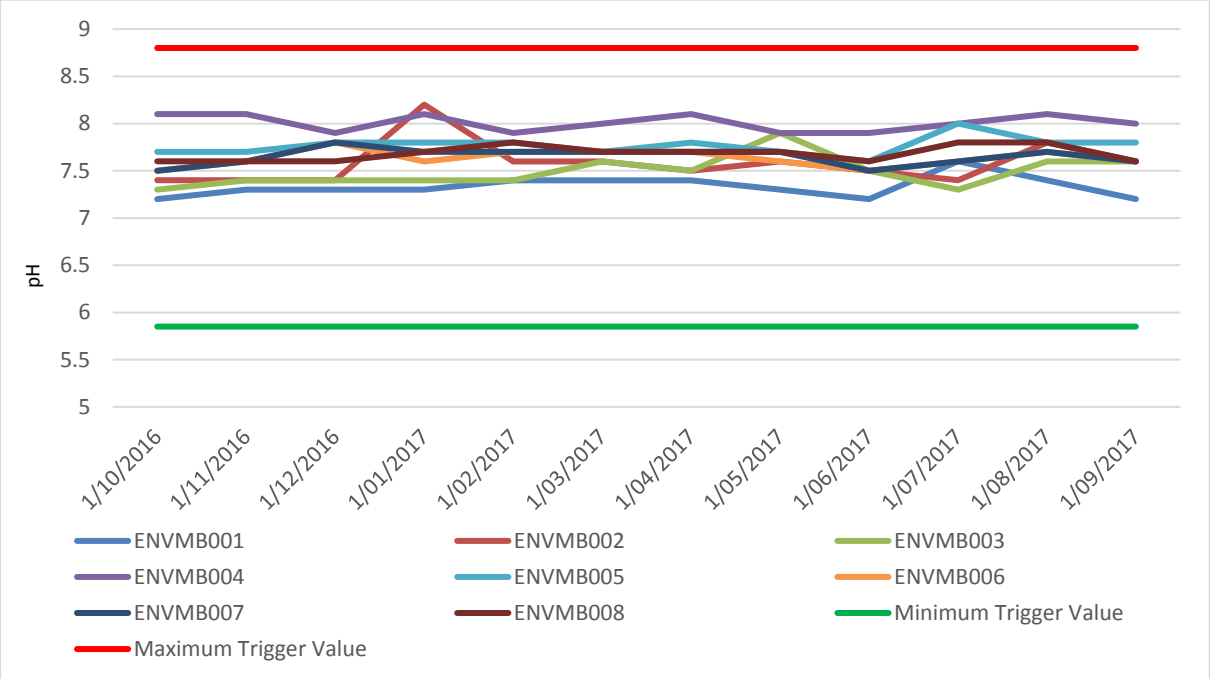


Figure 2: pH recorded in Environmental Monitoring Bores (Oct 2016 to Sept 2017)

Electrical Conductivity (EC) (Figure 3) varies between the monitoring bores, with ranges recorded during the reporting period between 4,500 µS/cm (recorded at ENVMB002) to 65,000 µS/cm (recorded at ENVMB001). The trigger value range for EC results (baseline ranges +/- 10%) is between 5,040 µS/cm and 54,670 µS/cm. During the reporting period, ENVMB001 exceeded the maximum EC trigger value for all sampled months with a maximum value of 65,000 µS/cm. This maximum EC value represents a 19% variation against baseline data. A monitoring result recorded for ENVMB002 during the reporting period in January 2017 was lower than the minimum EC trigger value. The lowest recorded value of 4500 µS/cm represents a 12% variation against baseline. A review of monitoring data indicates that this result is most likely a sampling or analysis error as the EC results returned to normal limits the following month.

The percentage variations at both the maximum and minimum EC trigger values suggests that a trigger value range of 10% variation against baseline may not account for natural variations in groundwater quality. It is recommended that the next review of the Environmental Monitoring Strategy re-evaluate the 10% variation against baseline groundwater quality trigger, particularly in the context of a saline to hypersaline groundwater environment.

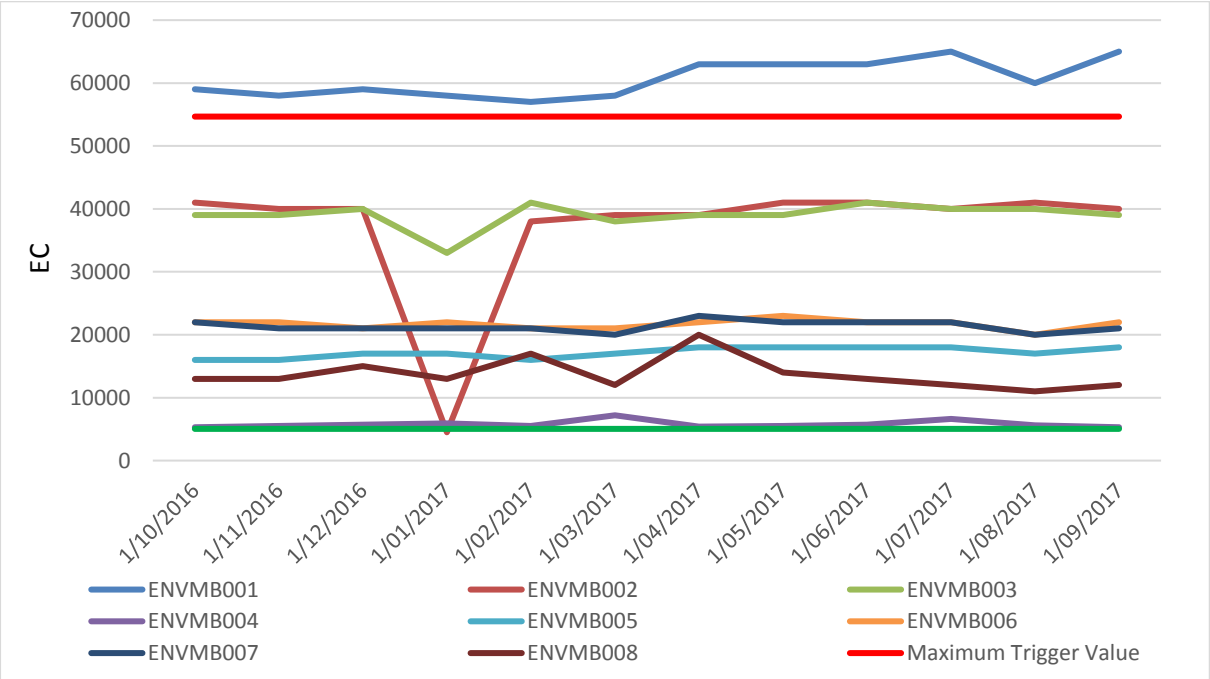


Figure 3: Electrical Conductivity recorded in the Environmental Monitoring Bores (Oct 2016 to Sept 2017)

Total Dissolved Solids (TDS) recorded at the Environmental Monitoring Bores during the reporting period ranged between 2,500 mg/L (recorded at ENVMB002) and 47,000 mg/L (recorded at ENVMB001) (Figure 4). The trigger value range for TDS results (baseline ranges +/- 10%) is between 2,943 and 45,210 mg/L. During the reporting period, ENVMB001 exceeded the maximum TDS trigger value in September 2017. Monitoring results recorded for ENVMB002 during the reporting period of January 2017 were lower than the minimum TDS trigger value. A review of monitoring data indicates that this result is most likely a sampling or analysis error as the TDS results returned to normal limits the following month.

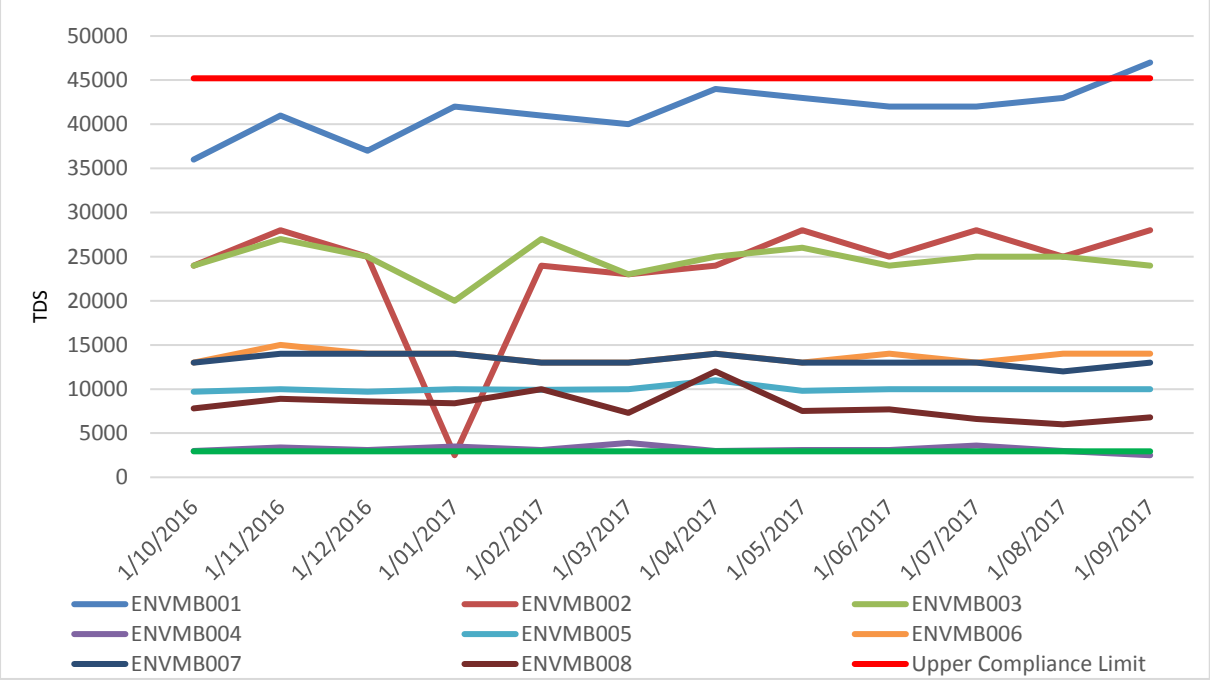


Figure 4: TDS recorded in the Environmental Monitoring Bores (Oct 2016 to Sep 2017)

Weak Acid Dissociable Cyanide (WAD CN) was detected at ENVMB001, ENVMB002 and ENVMB003 during the reporting period, with results recorded ranging between 0.006 mg/L WAD CN (recorded at ENVMB001) to 0.089 mg/L WAD CN (recorded at ENVMB003).

- WAD CN was detected in ENVMB001 in 8 out of 12 months during the reporting period.
- WAD CN was detected in ENVMB002 in January 2017.
- WAD CN was detected in ENVMB003 in January 2017.

All WAD CN results were well below the 0.5 mg/L limit which was previously contained within the Tropicana Gold Mine Prescribed Premise Licence L8676/2012/1 approved under the *Environmental Protection Act 1986*. The International Cyanide Management Code also establishes 0.5 mg/L WAD CN as the guidance value for environmental protection.

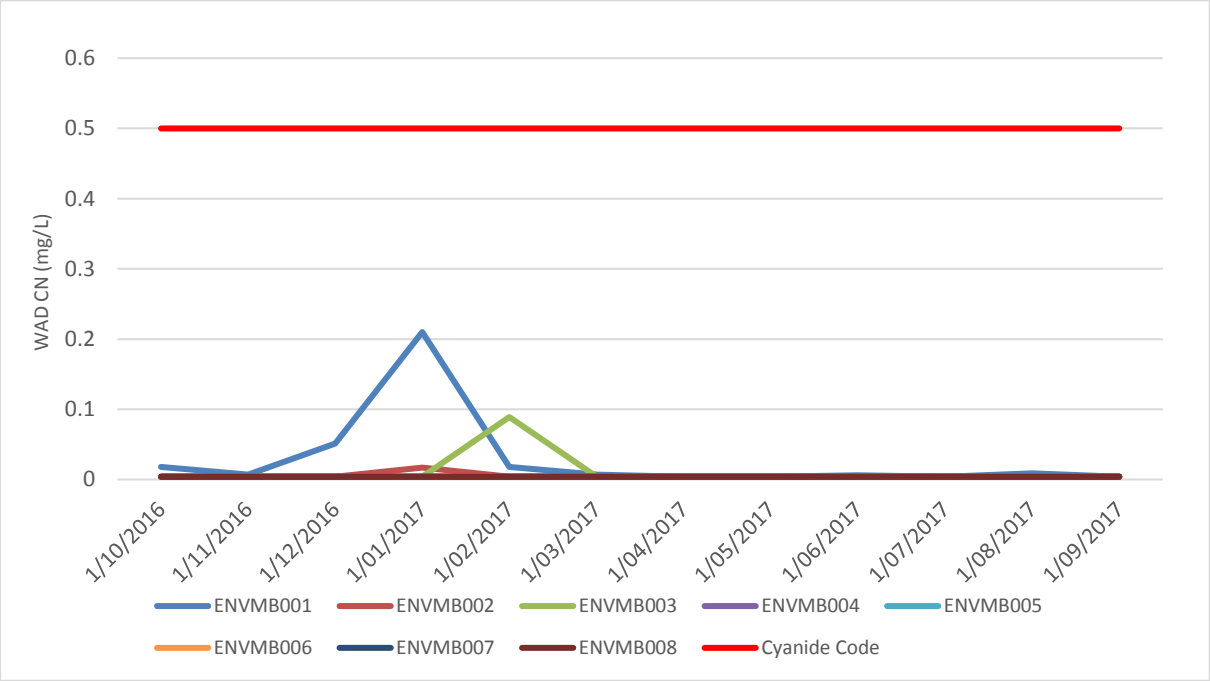


Figure 5: Environmental Monitoring Bores WAD Cyanide values (Oct 2016 to Sept 2017) *Values recorded at below the minimum detectable limit of 0.004mg/L are represented as 0.002mg/L

The triggers (minimum and maximum) for a 10% deviation from baseline values are outlined in Table 1 for each parameter. A comparison has been undertaken against the trigger values and the current ranges recorded in the environmental monitoring bores during the reporting period.

Table 1: Comparison of current groundwater quality data (reporting period October 2016 to September 2017) trigger value range (baseline +/- 10%)

Parameter	Trigger Range (Baseline +/- 10%)	Current Range (Reporting period)	Comments
Arsenic (mg/L)	< 0.001 – 0.55	<0.001 – 0.004	Current range within 10% deviation of baseline values.
Bicarbonate Alkalinity as HCO3 (mg/L)	135 – 682	130 – 700	Current range exceeds 10% deviation of baseline values with a lower minimum and higher maximum values recorded. Maximum exceedances were recorded at ENVMB005 values lower than the minimum range were recorded at ENVMB004
Boron (mg/L)	3.51 – 12.1	0.98 – 14	Current range exceeds 10% deviation of baseline values with a lower minimum and higher maximum values recorded. Maximum exceedances were recorded at ENVMB001 and values lower than the minimum range were recorded at ENVMB004 and ENVMB008.
Cadmium – Dissolved (mg/L)	<0.0001 – 0.0055	0.0001 – 0.0017	Current range within 10% deviation of baseline values.
Calcium – Dissolved (mg/L)	56.7 – 704	82 – 820	Current range exceeds 10% deviation of baseline values with higher maximum values recorded. Exceedances were recorded at ENVMB001.
Carbonate CO32 – as CaCO3 (mg/L)	<5	<5	Current range within 10% deviation of baseline values.
Chloride in water (mg/L)	2250 – 18700	1600 – 26000	Current range exceeds 10% deviation of baseline values with a lower minimum and higher maximum values recorded. Maximum exceedances were recorded at ENVMB001 and values lower than the minimum range were recorded at ENVMB004.
Cobalt – Dissolved (mg/L)	<0.001 – 0.0132	0.002 – 0.91	Current range exceeds 10% deviation of baseline values with higher maximum values recorded. Exceedances were recorded at ENVMB001.
Copper – Dissolved (mg/L)*	<0.001 – 0.11	0.001 – 0.27	Current range exceeds 10% deviation of baseline values with higher maximum values recorded. Exceedances were recorded at ENVMB003.
Cyanide WAD (mg/L)	<0.004	<0.004 – 0.089	Current range exceeds 10% deviation of baseline values with higher maximum values recorded. Exceedances were recorded at ENVMB001, ENVMB002 and ENVMB003.
Electrical Conductivity (uS/cm)	5040 – 54670	4500 – 65000	Current range exceeds 10% deviation of baseline values with a lower minimum and higher maximum values recorded. Maximum exceedances were recorded at ENVMB001 and values lower than the minimum range were recorded at ENVMB002.
Hydroxide OH – as CaCO3 (mg/L)	<5	<5	Current range within 10% deviation of baseline values.
Iron – Dissolved (mg/L)	<0.02 – 1.98	0.052 – 1.9	Current range within 10% deviation of baseline values.
Lead – Dissolved (mg/L)	<0.001 – 0.33	0.094 – 0.51	Current range exceeds 10% deviation of baseline values with a higher maximum value recorded. Exceedances were recorded at ENVMB007.
Magnesium – Dissolved (mg/L)	117 – 2090	150 – 2300	Current range exceeds 10% deviation of baseline values with higher maximum values recorded. Exceedances were recorded at ENVMB001.
Manganese – Dissolved (mg/L)	<0.005 – 4.07	0.004 – 0.94	Current range within 10% deviation of baseline values.
Nickel – Dissolved (mg/L)	<0.001 – 0.022	0.001 – 0.085	Current range exceeds 10% deviation of baseline values with a higher maximum value recorded. Exceedances were recorded at ENVMB003, ENVMB004, ENVMB006, ENVMB007 and ENVMB008.

Parameter	Trigger Range (Baseline +/- 10%)	Current Range (Reporting period)	Comments
Nitrate as NO3 (mg/L)	<10 – 176	<0.2 – 270	Current range exceeds 10% deviation of baseline values with a lower minimum and higher maximum values recorded. Values Maximum exceedances were recorded at ENVMB001 and valuesower than minimum ragne were recorded at ENVMB001, ENVMB002, ENVMB003, ENVMB006 and ENVMB007.
pH	5.85 – 8.8	7.2 – 8.2	Current range within 10% deviation of baseline values.
Potassium – Dissolved (mg/L)	51.3 – 924	54 – 830	Current range within 10% deviation of baseline values.
Sodium – Dissolved (mg/L)	494.1 – 10670	540 – 11000	Current range exceeds 10% deviation of baseline values with a higher maximum value recorded. Exceedances were recorded at ENVMB001.
Sulphate in water (mg/L)	108 – 5170	51 – 4900	Current range exceeds 10% deviation of baseline values with a lower minimum and values recorded. Values lower than the minimum range were recorded at ENVMB004.
Total Dissolved Solids (mg/L)	2943 – 45210	2500 – 44000	Current range exceeds 10% deviation of baseline values with a lower minimum and higher maximum values recorded. Maximum exceedances were recorded at ENVMB001 and values lower than the minimum range were recorded at ENVMB002 as well as ENVMB004.
Zinc – Dissolved (mg/L)	<0.001 – 0.154	<0.005 – 0.16	Current range exceeds 10% deviation of baseline values with a higher maximum value recorded. Exceedances were recorded at ENVMB006.

*Copper (Cu) only sampled in October 2016, November 2016 and December 2016.

Across all Environmental Monitoring Bores, a higher value than the maximum trigger value was recorded for the following parameters for at least one monitoring event during the reporting period:

- Bicarbonate
- Boron
- Calcium
- Chloride
- Cobalt
- WAD Cyanide
- EC
- NO^3
- Copper
- Magnesium
- Nickel
- Potassium
- Sodium
- Zinc
- TDS

Across all Environmental Monitoring Bores, a lower value than the minimum trigger value was recorded for the following parameters for at least one monitoring event during the reporting period:

- Boron
- Chloride
- EC
- HCO3
- Nitrate
- Sulphate
- TDS

Review of the Environmental Monitoring Bore results indicates that ENVMB001 exceeds the maximum trigger range for the sampled water quality parameters 35% of the time. In contrast, results for monitoring at ENVMB004 show that a lower value than the minimum trigger value was recorded for the sampled water quality parameters 12% of the time (Appendix 1).

The laboratory monitoring results collected from the Environmental Monitoring Bores during the reporting period are presented in Appendix 1.

Environmental Management

The operation of the TSF has been observed to have had a localised impact to groundwater quality during the reporting period, in particularly at ENVMB001. Localised changes in groundwater quality are not considered to have had any detrimental impact to environmental values. The existing groundwater environment is typically saline to hypersaline and has no known beneficial users. Baseline surveys within the Operational Area did not identify any stygofauna. Monitoring of vegetation condition in proximity to operational areas has not identified any impacts to vegetation health associated with changes in groundwater quality.

To mitigate potential impacts to environmental values, AGAA implemented a Seepage Mitigation Project in 2016. The Seepage Mitigation Project was continued throughout the reporting period, including ongoing operation of six (6) seepage recovery bores. During the current reporting period the following improvements have been made the project:

- Drilling of two (2) additional groundwater recovery bores on the southern side of the TSF.
- Installation of an additional groundwater recovery bore on the Northern side of the TSF.

AGAA will continue to monitor groundwater across the TGM and will implement additional mitigation actions as and when required to minimise the environmental impacts of the operation. The next review of the Environmental Monitoring Strategy will re-evaluate the 10% variation against baseline groundwater quality trigger, particularly in the context of a saline to hypersaline groundwater environment.

APPENDIX 1 GROUNDWATER MONITORING RESULTS

Values which exceed the maximum and minimum trigger values are highlighted red.

Monthly Groundwater Monitoring Results – ENVMB001 – ENVMB008

10% Variance in Baseline Trigger	Minimum Trigger Limit			5040	5.85	2943
	Maximum Trigger Limit		<0.004	54670	8.8	45210
Groundwater	Data Point	Date	WAD CN (mg/L)	EC (µS/cm)	pH (pH units)	TDS (mg/L)
	ENVMB001	6/10/2016	0.018	59000	7.2	36000
		20/11/2016	0.007	58000	7.3	41000
		4/12/2016	0.051	59000	7.3	37000
		11/01/2017	0.21	58000	7.3	42000
		3/02/2017	0.018	57000	7.4	41000
		12/03/2017	0.007	58000	7.4	40000
		21/04/2017	<0.004	63000	7.4	44000
		12/05/2017	<0.004	63000	7.3	43000
		23/06/2017	0.006	63000	7.2	42000
		14/07/2017	<0.004	65000	7.6	42000
		11/08/2017	0.009	60000	7.4	43000
		3/09/2017	<0.004	65000	7.2	47000
	ENVMB002	6/10/2016	<0.004	41000	7.4	24000
		20/11/2016	<0.004	40000	7.4	28000
		4/12/2016	<0.004	40000	7.4	25000
		11/01/2017	0.017	4500	8.2	2500
		29/01/2017	<0.004	38000	7.6	24000
		3/02/2017	<0.004	39000	7.6	23000
		12/03/2017	<0.004	39000	7.5	24000
		21/04/2017	<0.004	41000	7.6	28000
		12/05/2017	<0.004	41000	7.5	25000
		23/06/2017	<0.004	40000	7.4	28000
		14/07/2017	<0.004	41000	7.8	25000
		11/08/2017	<0.004	40000	7.6	28000
		3/09/2017	<0.004	40000	8	28000
	ENVMB003	6/10/2016	<0.004	39000	7.3	24000
		20/11/2016	<0.004	39000	7.4	27000
		4/12/2016	<0.004	40000	7.4	25000
		6/12/2016	<0.004	33000	7.4	20000
		14/01/2017	0.089	41000	7.4	27000
		3/02/2017	<0.004	38000	7.6	23000
		12/03/2017	<0.004	39000	7.5	25000
		20/04/2017	<0.004	39000	7.9	26000
		12/05/2017	<0.004	41000	7.5	24000
		23/06/2017	<0.004	40000	7.3	25000
		14/07/2017	<0.004	40000	7.6	25000
		11/08/2017	<0.004	39000	7.6	24000
		3/09/2017	<0.004	38000	7.5	27000
	ENVMB004	5/10/2016	<0.004	5300	8.1	3000

10% Variance in Baseline Trigger	Minimum Trigger Limit			5040	5.85	2943
	Maximum Trigger Limit		<0.004	54670	8.8	45210
		19/11/2016	<0.004	5500	8.1	3400
		4/12/2016	<0.004	5700	7.9	3100
		14/01/2017	<0.004	5900	8.1	3500
		5/02/2017	<0.004	5500	7.9	3100
		11/03/2017	<0.004	7200	8	3900
		21/04/2017	<0.004	5400	8.1	3000
		12/05/2017	<0.004	5500	7.9	3100
		25/06/2017	<0.004	5700	7.9	3100
		14/07/2017	<0.004	6600	8	3600
		11/08/2017	<0.004	5600	8.1	3000
		3/09/2017	<0.004	5300	8	2500
	ENVMB005	5/10/2016	<0.004	16000	7.7	9700
		19/11/2016	<0.004	16000	7.7	10000
		5/12/2016	<0.004	17000	7.8	9700
		15/01/2017	<0.004	17000	7.8	10000
		4/02/2017	<0.004	16000	7.8	9900
		12/03/2017	<0.004	17000	7.7	10000
		21/04/2017	<0.004	18000	7.8	11000
		12/05/2017	<0.004	18000	7.7	9800
		24/06/2017	<0.004	18000	7.6	10000
		15/07/2017	<0.004	18000	8	10000
		11/08/2017	<0.004	17000	7.8	10000
		3/09/2017	<0.004	18000	7.8	10000
	ENVMB006	5/10/2016	<0.004	22000	7.5	13000
		19/11/2016	<0.004	22000	7.6	15000
		6/12/2016	<0.004	21000	7.8	14000
		15/01/2017	<0.004	22000	7.6	14000
		4/02/2017	<0.004	21000	7.7	13000
		11/03/2017	<0.004	21000	7.7	13000
		21/04/2017	<0.004	22000	7.7	14000
		13/05/2017	<0.004	23000	7.6	13000
		24/06/2017	<0.004	22000	7.5	14000
		15/07/2017	<0.004	22000	7.6	13000
		11/08/2017	<0.004	20000	7.7	14000
		26/09/2017	<0.004	22000	7.6	14000
	ENVMB007	5/10/2016	<0.004	22000	7.5	13000
		19/11/2016	<0.004	21000	7.6	14000
		6/12/2016	<0.004	21000	7.8	14000
		15/01/2017	<0.004	21000	7.7	14000
		2/02/2017	<0.004	21000	7.7	13000
		11/03/2017	<0.004	20000	7.7	13000
		21/04/2017	<0.004	23000	7.7	14000
		13/05/2017	<0.004	22000	7.7	13000

10% Variance in Baseline Trigger	Minimum Trigger Limit			5040	5.85	2943
	Maximum Trigger Limit		<0.004	54670	8.8	45210
		24/06/2017	<0.004	22000	7.5	13000
		15/07/2017	<0.004	22000	7.6	13000
		11/08/2017	<0.004	20000	7.7	12000
		26/09/2017	<0.004	21000	7.6	13000
	ENVMB008	5/10/2016	<0.004	13000	7.6	7800
		19/11/2016	<0.004	13000	7.6	8900
		4/12/2016	<0.004	15000	7.6	8600
		14/01/2017	<0.004	13000	7.7	8400
		4/02/2017	<0.004	17000	7.8	10000
		11/03/2017	<0.004	12000	7.7	7300
		21/04/2017	<0.004	20000	7.7	12000
		13/05/2017	<0.004	14000	7.7	7500
		25/06/2017	<0.004	13000	7.6	7700
		14/07/2017	<0.004	12000	7.8	6600
		11/08/2017	<0.004	11000	7.8	6000
		26/09/2017	<0.004	12000	7.6	6800

Values which exceed the maximum and minimum trigger values are highlighted red.

Quarterly Groundwater Monitoring Results – ENVMB001 – ENVMB008

10% Variance in Baseline Trigger	Maximum Trigger Limit (10%)		<0.001			3.51	135		<0.0001	56.7	2250			<0.001	<0.001			<0.02	<0.001	117	<0.005		<0.001	<10	51.3		494.1	108	<0.001
	Minimum Trigger Limit (10%)		0.55			12.1	682	<5	0.0055	704	18700			0.0132	0.11		<5	1.98	0.33	2090	4.07		0.022	176	924		10670	5170	0.154
Data Point	Date	Antimony-D (mg/L)	As - D (mg/L)	Ba - D (mg/L)	Beryllium Dissolved (mg/L)	Bo - D (mg/L)	Bicarbonate Alkalinity (mg/L)	Carbonate Alkalinity (mg/L)	Cd - D (mg/L)	Calcium - Dissolved (mg/L)	Cl (mg/L)	Chromium. Cr3+ (mg/L)	Chromium. Cr6+ (mg/L)	Co - D (mg/L)	Cu - D (mg/L)	Fluoride by ISE (mg/L)	Hydroxide Alkalinity as CaCO3 (mg/L	Fe - D (mg/L)	Pb - D (mg/L)	Magnesium - Dissolve (mg/L)	Mn - D (mg/L)	Mercury - Dissolved (mg/L)	Ni - D (mg/L)	NO3 (mg/L)	Potassium - Dissolve (mg/L)	Selenium-Dissolved (mg/L)	Sodium - Dissolved (mg/L)	SO4 (mg/L)	Zn - D (mg/L)
ENVMB001	6/10/2016		<0.02	0.029		13	370	<1	<0.002	710	19000		<0.004	0.32	<0.02			0.14	<0.02	2300	<0.02	0.003	<0.02	190	620		11000	4200	<0.1
	20/11/2016	<0.02	<0.02	0.028	<0.02	12	360		<0.002	710	20000	<0.05	0.012	0.33	<0.02	1.5		0.11	<0.02	2200	<0.02	0.0032	<0.02	200	720	0.022	11000	4900	<0.1
	4/12/2016		<0.02	0.03		12	390	<1	<0.002	730	21000		0.01	0.48	0.088			0.1	<0.02	2200	<0.02	0.003	0.037	200	700		11000	4600	<0.1
	3/02/2017	<0.02	<0.02	0.027	<0.02	12	320	<5	<0.002	770	21000	<0.05	0.009	0.54		0.6	<5	<0.1	<0.02	2100	<0.02	0.0011	<0.02	160	750	<0.02	10000	4200	<0.1
	12/05/2017	<0.02	<0.02	0.029	<0.02	10	320	<5	<0.002	820	26000	<0.05	0.008	0.77		1.7	<5	0.14	<0.02	2200	<0.02	0.002	0.027	270	830	<0.02	11000	4300	<0.1
	11/08/2017	<0.02	<0.02	0.039	<0.02	11	320	<5	<0.002	750	23000	<0.05	0.006	0.91		0.8	<5	0.32	<0.02	2300	0.03	0.001	<0.02	170	820	<0.02	11000	3800	<0.1
ENVMB002	6/10/2016		<0.01	0.031		9.1	310	<1	<0.001	520	13000		<0.004	<0.01	<0.01			1.9	<0.01	1400	0.76	<0.00005	<0.01	<0.2	390		7700	3100	<0.05
	20/11/2016	<0.01	<0.01	0.03	<0.01	8.5	320		<0.001	500	13000	<0.05	<0.004	<0.01	<0.01	0.6		1.7	<0.01	1300	0.75	<0.00005	0.012	0.9	430	<0.01	7900	3600	<0.05
	4/12/2016		<0.02	0.03		8.9	320	<1	<0.002	510	14000		<0.004	<0.02	0.075			<0.1	<0.02	1300	0.77	<0.00005	<0.02	<0.2	420		7500	3600	<0.1
	3/02/2017	<0.01	<0.01	0.028	<0.01	8.4	250	<5	<0.001	500	13000	<0.05	<0.004	<0.01		0.6	<5	<0.05	0.051	1300	0.73	<0.00005	0.013	<0.2	410	<0.01	7200	3300	<0.05
	12/05/2017	<0.02	<0.02	0.028	<0.02	7.5	270	<5	<0.002	480	15000	<0.05	<0.004	<0.02		0.6	<5	<0.1	<0.02	1300	0.64	<0.00005	<0.02	1.6	430	<0.02	7400	3500	<0.1
	11/08/2017	<0.01	<0.01	0.03	<0.01	8.8	270	<5	<0.001	470	12000	<0.05	<0.004	<0.01		0.4	<5	<0.05	<0.01	1400	0.76	<0.00005	<0.01	0.5	480	<0.01	7500	3300	<0.05
ENVMB003	6/10/2016		<0.01	0.062		9.5	250	<1	0.0012	390	13000		<0.004	<0.01	<0.01			<0.05	<0.01	1300	0.053	0.00016	0.023	56	400		7500	3100	<0.05
	20/11/2016	<0.01	<0.01	0.09	<0.01	9.1	250		0.002	390	13000	<0.05	0.009	<0.01	<0.01	1.2		<0.05	<0.01	1200	0.11	<0.00005	0.044	65	440	0.026	7600	3700	<0.05
	4/12/2016		<0.02	0.072		8.7	260	<1	<0.002	400	14000		0.006	<0.02	0.14			<0.1	<0.02	1200	0.12	<0.00005	0.029	55	440		7600	3800	<0.1
	6/12/2016		<0.01	0.044		7.3	210		<0.001	360	11000		0.005	<0.01	0.27			<0.05	0.05	1100	0.27	<0.00005	0.019	0.9	420		6100	2700	0.075
	3/02/2017	<0.01	<0.01	0.059	<0.01	9.2	210	<5	0.0017	400	13000	<0.05	0.007	<0.01		1	<5	<0.05	0.13	1300	0.11	0.0001	0.035	55	420	0.02	7200	3500	0.097
	12/05/2017	<0.02	<0.02	0.062	<0.02	7.8	210	<5	<0.002	380	14000	<0.05	0.008	<0.02		1	<5	<0.1	<0.02	1200	0.086	0.00008	0.024	60	450	<0.02	7600	3600	<0.1
	11/08/2017	<0.01	<0.01	0.064	<0.01	8.9	220	<5	0.0013	350	12000	<0.05	<0.004	<0.01		0.7	<5	<0.05	<0.01	1200	0.18	<0.00005	0.06	47	470	0.013	6700	3300	0.12

10% Variance in Baseline Trigger	Maximum Trigger Limit (10%)		<0.001			3.51	135		<0.0001	56.7	2250			<0.001	<0.001			<0.02	<0.001	117	<0.005		<0.001	<10	51.3		494.1	108	<0.001
	Minimum Trigger Limit (10%)		0.55			12.1	682	<5	0.0055	704	18700			0.0132	0.11		<5	1.98	0.33	2090	4.07		0.022	176	924		10670	5170	0.154
ENVMB004	5/10/2016		<0.001	0.29		1.3	160	<1	<0.0001	270	1800		<0.004	<0.001	<0.001			<0.005	<0.001	160	0.002	<0.00005	0.004	61	54		560	51	<0.005
	19/11/2016	<0.001	<0.001	0.28	<0.001	1.3	150		<0.0001	260	1600	<0.05	<0.004	<0.001	<0.001	0.3		<0.005	<0.001	160	<0.001	<0.00005	0.003	66	57	<0.001	550	52	<0.005
	4/12/2016		<0.001	0.31		1.3	170	<1	<0.0001	280	1800		<0.004	<0.001	0.022			<0.005	0.003	160	0.001	<0.00005	0.002	63	57		550	75	0.03
	5/02/2017	<0.001	<0.001	0.32	<0.001	1.3	130	<5	<0.0001	270	1600	<0.05	<0.004	<0.001		0.2	<5	0.023	<0.001	160	0.005	<0.00005	0.015	41	57	<0.001	540	53	0.017
	12/05/2017	<0.001	<0.001	0.36	<0.001	0.98	140	<5	<0.0001	270	1800	<0.05	<0.004	<0.001		0.3	<5	0.012	0.003	150	<0.001	<0.00005	0.007	64	62	<0.001	560	59	0.019
	11/08/2017	<0.001	<0.001	0.26	<0.001	1.4	130	<5	<0.0001	270	1700	<0.05	<0.004	<0.001		0.3	<5	0.095	<0.001	170	0.008	0.00005	0.026	58	67	<0.001	590	73	0.1
ENVMB005	5/10/2016		0.001	0.046		7	690	<1	<0.0005	88	4700		<0.004	<0.005	<0.005			<0.025	<0.005	260	0.019	<0.00005	0.001	160	160		3500	1400	0.006
	19/11/2016	<0.005	<0.005	0.052	<0.005	7.2	700		<0.0005	93	4500	<0.05	0.005	<0.005	<0.005	0.7		<0.025	<0.005	270	0.013	<0.00005	0.007	170	180	0.015	3600	1500	<0.025
	5/12/2016		<0.005	0.033		6.6	690		<0.0005	82	4500		0.006	<0.005	0.057			<0.025	0.008	240	<0.005	<0.00005	0.009	140	160		3300	1500	0.044
	4/02/2017	<0.005	<0.005	0.035	<0.005	6.5	580	<5	<0.0005	89	4400	<0.05	<0.004	<0.005		0.8	<5	<0.025	<0.005	260	0.007	<0.00005	0.008	81	160	0.011	3300	1400	0.048
	12/05/2017	<0.01	<0.01	0.037	<0.01	6.1	590	<5	<0.001	90	5200	<0.05	0.006	<0.01		0.7	<5	<0.05	<0.01	270	<0.01	<0.00005	<0.01	160	180	0.011	3500	1500	<0.05
	11/08/2017	<0.005	<0.005	0.034	<0.005	6.8	590	<5	<0.0005	97	4300	<0.05	<0.004	<0.005		0.7	<5	<0.025	<0.005	290	0.006	<0.00005	0.012	140	190	0.011	3400	1500	0.068
ENVMB006	5/10/2016		<0.005	0.045		5.2	500	<1	<0.0005	440	6900		<0.004	<0.005	<0.005			<0.025	<0.005	820	0.2	<0.00005	<0.005	9.6	160		3700	2000	<0.025
	19/11/2016	<0.01	<0.01	0.035	<0.01	5.2	500		<0.001	440	6600	<0.05	0.005	<0.01	<0.01	0.5		<0.05	<0.01	810	0.027	<0.00005	0.018	14	170	0.013	3700	2200	<0.05
	6/12/2016		<0.005	0.031		5.1	530		<0.0005	410	6300		<0.004	<0.005	0.1			<0.025	0.006	740	0.033	<0.00005	0.01	8.7	160		3500	2200	0.057
	4/02/2017	<0.005	<0.005	0.029	<0.005	5	450	<5	0.0005	410	6100	<0.05	<0.004	<0.005		0.5	<5	<0.025	0.006	760	0.013	<0.00005	0.038	24	160	0.011	3500	2000	0.16
	13/05/2017	<0.01	<0.01	0.03	<0.01	4.2	450	<5	<0.001	410	7100	<0.05	0.004	<0.01		0.4	<5	<0.05	<0.01	760	0.087	<0.00005	0.042	13	170	<0.01	3600	2200	0.1
	11/08/2017	<0.005	<0.005	0.039	<0.005	4.7	410	<5	<0.0005	400	5900	<0.05	<0.004	<0.005		0.3	<5	<0.025	<0.005	770	0.009	0.00006	0.021	17	160	0.007	3400	2100	0.16
ENVMB007	5/10/2016		<0.005	0.055		5.5	540	<1	<0.0005	450	6300		<0.004	<0.005	<0.005			<0.025	<0.005	710	0.21	<0.00005	0.008	4.7	140		3700	1900	<0.025
	19/11/2016	<0.01	<0.01	0.056	<0.01	5.5	550		<0.001	450	6400	<0.05	0.005	<0.01	<0.01	0.5		<0.05	<0.01	710	0.26	<0.00005	0.023	9.4	160	0.012	3800	2200	<0.05
	6/12/2016		<0.005	0.051		5.2	560		<0.0005	410	6200		<0.004	<0.005	0.073			<0.025	0.007	650	0.21	<0.00005	0.011	7.7	150		3600	2200	0.063
	2/02/2017	<0.005	<0.005	0.048	<0.005	5.1	330	<5	<0.0005	430	6200	<0.05	<0.004	<0.005		0.5	<5	<0.025	0.009	670	0.094	<0.00005	0.025	5.3	140	0.008	3500	2000	0.066
	13/05/2017	<0.01	<0.01	0.049	<0.01	4.5	200	<5	<0.001	410	6800	<0.05	<0.004	<0.01		0.5	<5	<0.05	<0.01	650	0.21	<0.00005	0.033	8	150	<0.01	3600	2100	0.081
	11/08/2017	<0.005	<0.005	0.045	<0.005	5.2	190	<5	<0.0005	410	6300	<0.05	0.005	<0.005		0.4	<5	<0.025	<0.005	710	0.11	<0.00005	0.017	9.1	160	0.006	3600	2100	0.097
ENVMB008	5/10/2016		<0.005	0.066		2.6	240	<1	<0.0005	380	3900		<0.004	<0.005	<0.005			<0.025	<0.005	490	<0.005	<0.00005	<0.005	48	71		1900	1200	<0.025
	19/11/2016	<0.005	<0.005	0.073	<0.005	2.5	240		<0.0005	370	3900	<0.05	<0.004	<0.005	<0.005	0.2		<0.025	<0.005	500	<0.005	<0.00005	<0.005	48	81	0.016	2000	1300	<0.025
	4/12/2016		<0.005	0.055		3.2	250	<1	<0.0005	450	4400		<0.004	<0.005	0.061			<0.025	0.012	580	<0.005	<0.00005	<0.005	41	93		2200	1500	0.027
	4/02/2017	<0.005	<0.005	0.078	<0.005	2.4	330	<5	<0.0005	410	5000	<0.05	<0.004	<0.005		0.4	<5	<0.025	<0.005	520	0.008	<0.00005	0.024	18	88	0.008	1900	1700	0.079
	13/05/2017	<0.005	<0.005	0.093	<0.005	3.3	200	<5	<0.0005	340	4200	<0.05	<0.004	<0.005		0.2	<5	<0.025	<0.005	440	0.069	<0.00005	0.085	48	89	0.014	2000	1300	0.057
	11/08/2017	<0.005	<0.005	0.21	<0.005	2.2	190	<5	<0.0005	320	3100	<0.05	<0.004	<0.005		0.2	<5	<0.025	<0.005	360	0.006	<0.00005	0.018	46	79	0.009	1500	920	0.14

Appendix 4: Surface Water Monitoring

MEMORANDUM

Date: 21 November 2017

To: Environment Team

From: Sarah Brown

Subject: 2016/2017 Surface Water Monitoring Results

Surface water quality monitoring is undertaken in accordance with the Tropicana Gold Mine Environmental Monitoring Strategy, with samples collected following significant rain events of over 20 millimetres (mm) in 24 hours or when surface water is observed in collection locations.

Surface water sampling locations have been established in and around the operational area however no permanent surface water sites occur. Therefore surface water sampling is only able to be collected following significant rainfall events. Additional surface water sample locations have been established progressively as the project has transitioned from construction to operational phases.

Event sampling was undertaken on four occasions during the reporting period following significant rainfall events:

- 13 December 2016
- 17 January 2017
- 1 February 2017
- 25 March 2017

The following locations were sampled:

TGMSW01	TGMSW06
TGMSW02	TGMSW07
TGMSW03	TGMSW08
TGMSW04	TGMSW09
TGMSW05	TGMSW10

The locations of these sampling sites are shown in Figure 1.

Figure 1: Surface Water Sampling Locations 2016

Surface Water Monitoring Results

Results obtained from surface water sampling conducted during the reporting period are provided in Appendix 1 and discussed briefly below.

The pH of samples collected across the surface water sampling locations ranged between 7.2 and 8 pH units (Figure 2).

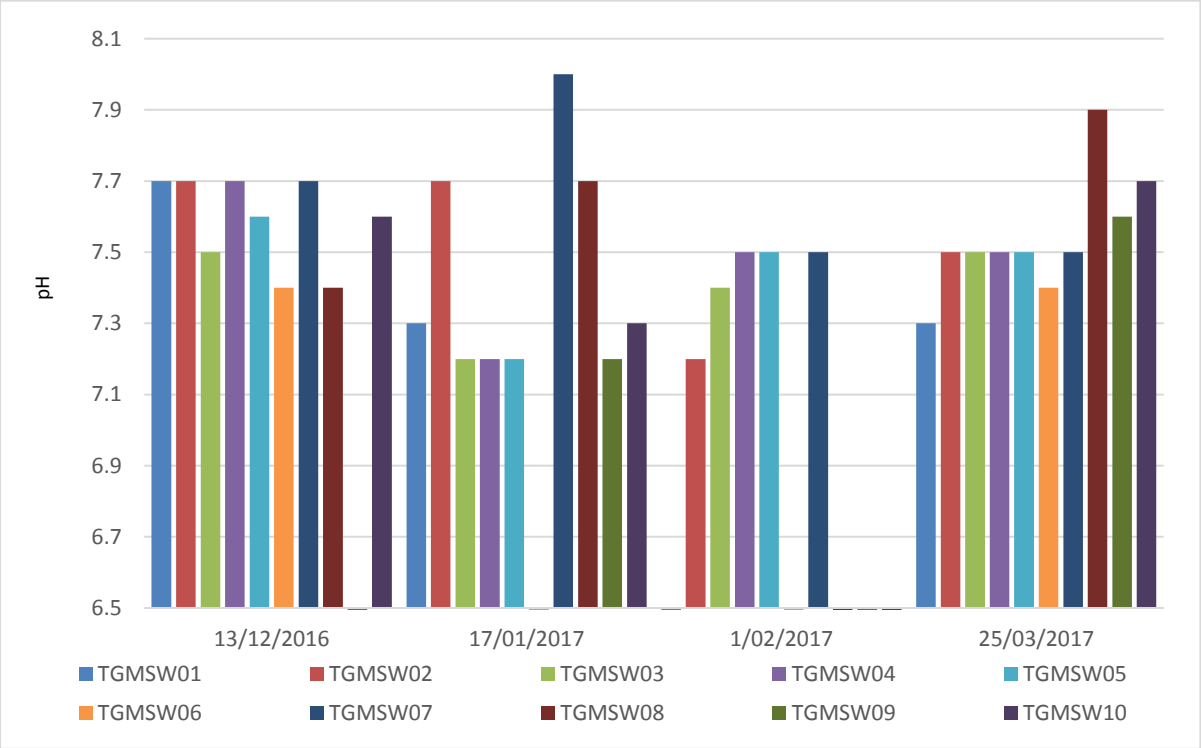


Figure 2: pH Recorded during Surface Water Monitoring (Oct 2015 to Sep 2016)

Electrical Conductivity (EC) recorded across the surface water sampling locations ranged between 66 µS/cm to 9,000 µS/cm and Total Dissolved Solids (TDS) values ranged from 220 mg/L to 5800 mg/L Higher EC and TDS results were recorded at TGMSW10 and TGMSW09. These results are likely to be due to the use of hypersaline water for dust suppression on haul roads and active mining areas.

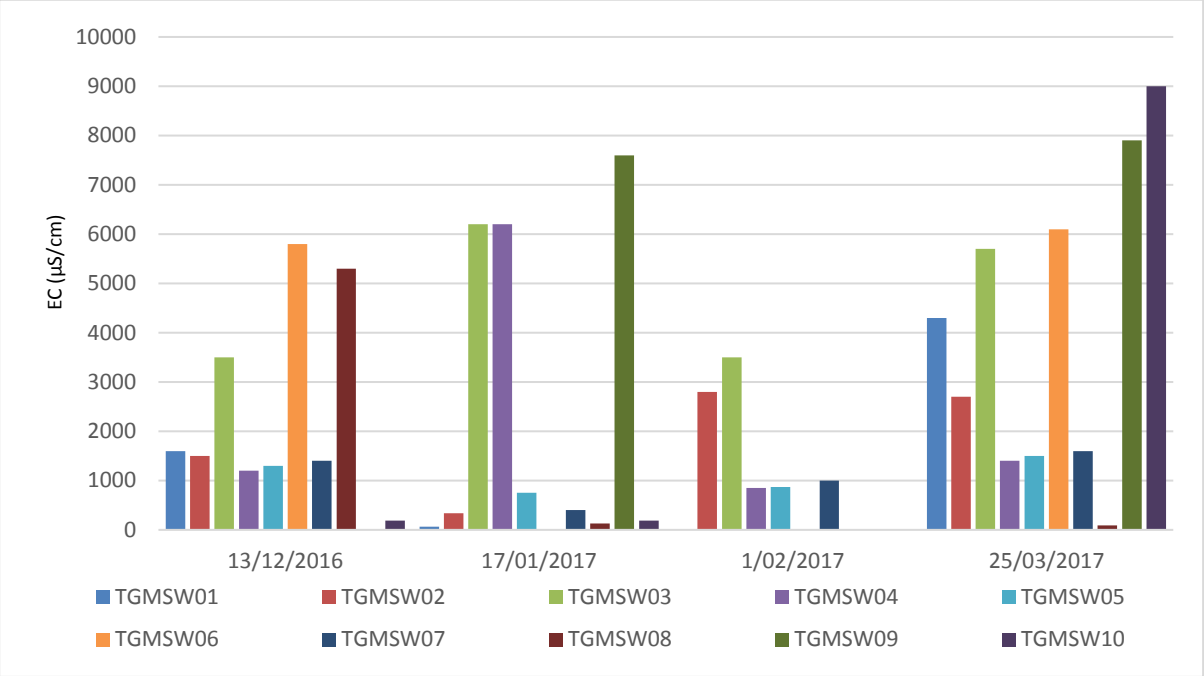


Figure 3: Electrical Conductivity Recorded during Surface Water Monitoring (Oct 2016 to Sept 2017)

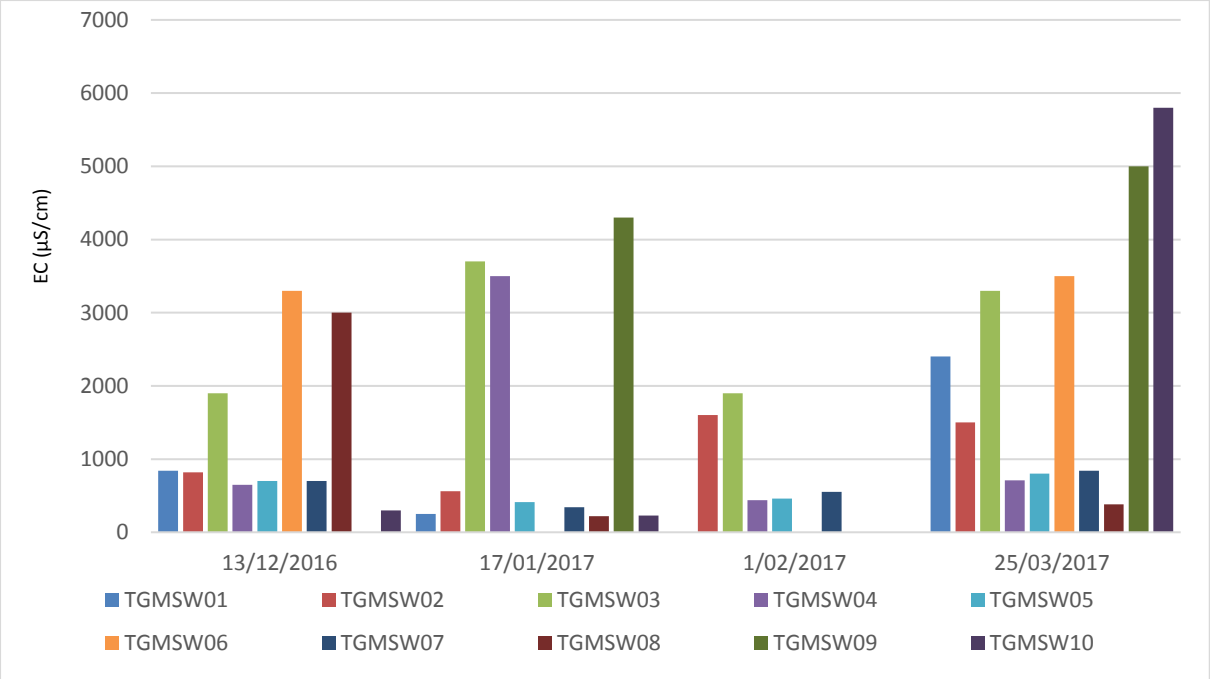


Figure 4: Electrical Conductivity Recorded during Surface Water Monitoring (Oct 2016 to Sept 2017)

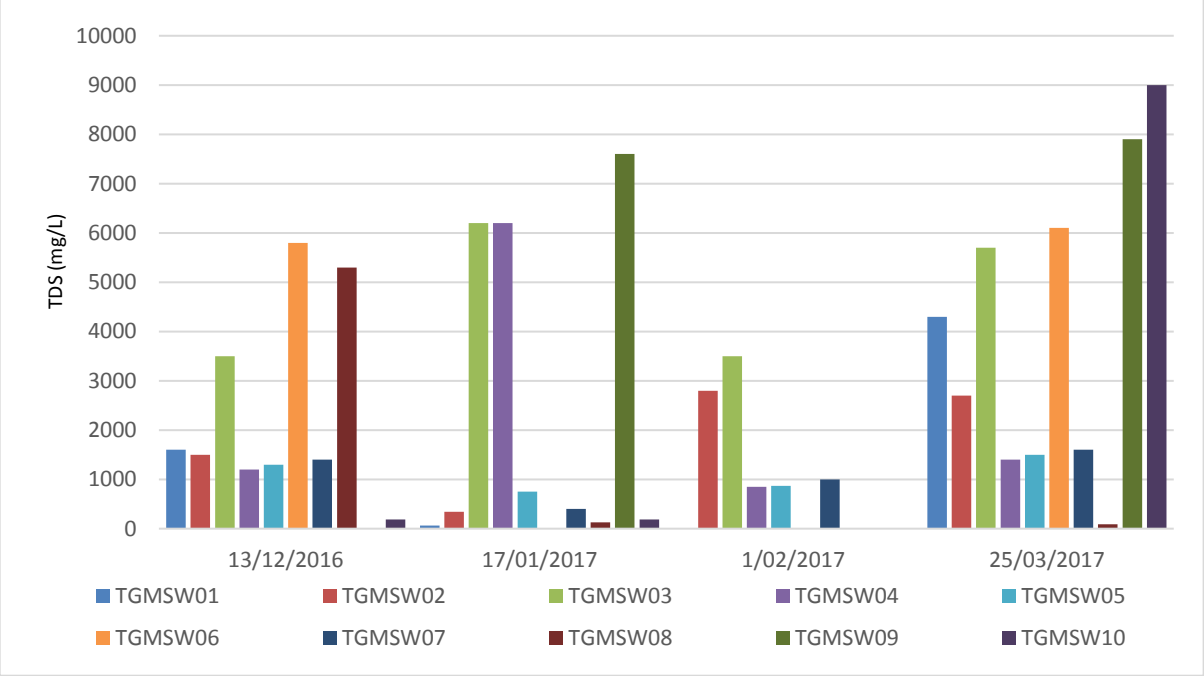


Figure 5: Total Dissolved Solids Recorded during Surface Water Monitoring (Oct 2016 to Sep 2017)

Appendix 1: Surface Water Results

Data Point	Date	Al - T (mg/L)	As - T (mg/L)	Bicarbonate Alkalinity (mg/L)	Cd - T (mg/L)	Calcium - Total (mg/L)	Carbonate Alkalinity (mg/L)	Cl (mg/L)	Cr - T (mg/L)	Cu - T (mg/L)	Cyanide - Free (mg/L)	CN - T (mg/L)	WAD CN (mg/L)	EC (µS/cm)	Hardness - Total (mg/L)	Hydroxide Alkalinity (mg/L)	Fe - T (mg/L)	Pb - T (mg/L)	Magnesium - Total (mg/L)	Mn - T (mg/L)	Hg - T (mg/L)	Ni - T (mg/L)	NO3 (mg/L)	pH (pH units)	Potassium - Total (mg/L)	Sodium - Total (mg/L)	SO4 (mg/L)	TDS (mg/L)	TSS (mg/L)
TGMSW01	13/12/2016	3.7	0.001	29	<0.0001	48	<1	400	0.013	0.005	0.006	0.008	0.006	1600		<5	6.2	0.003	22	0.057	<0.00005	0.005	2.2	7.7	13	240	88	840	180
	17/01/2017	6.9	0.001	29	<0.0001	4.4	<1	8	0.016	0.006	<0.004	<0.004	<0.004	66		<5	9.7	0.25	1.4	0.055	<0.00005	0.005	0.6	7.3	2.1	8.8	<1	250	170
	25/03/2017	3.9	0.002	25	<0.0001	120	<1	1200	0.016	0.005	<0.004	<0.004	<0.004	4300	440	<5	8.6	0.003	35	0.19	<0.00005	0.004	1.2	7.3	19	710	300	2400	240
TGMSW02	13/12/2016	1.1	<0.001	27	<0.0001	47	<1	390	0.004	0.002	<0.004	<0.004	<0.004	1500		<5	1.8	0.001	21	0.021	<0.00005	0.002	2.1	7.7	12	230	87	820	50
	17/01/2017	17	0.003	40	<0.0001	9.9	<1	57	0.035	0.014	<0.004	<0.004	<0.004	340		<5	15	0.008	7.7	0.081	<0.00005	0.011	1.9	7.7	9.6	54	42	560	1200
	1/02/2017	1	<0.001	18	<0.0001	100	<1	690	0.006	0.004	0.025	0.027	0.027	2800			1.9	0.001	49	0.023	<0.00005	0.003	5	7.2	19	390	220	1600	56
	25/03/2017	0.55	<0.001	30	<0.0001	71	<1	700	0.004	0.002	0.008	0.009	0.008	2700	280	<5	0.82	<0.001	24	0.018	<0.00005	0.001	0.9	7.5	15	430	160	1500	18
TGMSW03	13/12/2016	1.1	<0.001	25	<0.0001	110	<1	910	0.002	0.001	<0.004	<0.004	<0.004	3500		<5	0.78	<0.001	55	0.028	<0.00005	0.001	3.4	7.5	22	520	270	1900	29
	17/01/2017	0.56	<0.005	24	<0.0005	220	<1	1800	<0.005	<0.005	<0.004	<0.004	<0.004	6200		<5	1.2	<0.005	87	0.026	<0.00005	<0.005	2.4	7.2	36	1000	500	3700	29
	1/02/2017	0.96	<0.001	28	<0.0001	110	<1	870	0.005	0.003	<0.004	<0.004	<0.004	3500			1.8	0.001	64	0.034	<0.00005	0.002	5.4	7.4	23	510	220	1900	65
	25/03/2017	2.4	<0.005	30	<0.0005	150	<1	1700	<0.005	<0.005	<0.004	<0.004	<0.004	5700	630	<5	1.4	<0.005	63	0.028	<0.00005	<0.005	1.9	7.5	29	960	330	3300	29
TGMSW04	13/12/2016	2.3	<0.001	29	<0.0001	37	<1	310	0.008	0.006	0.006	0.009	0.007	1200		<5	3.9	0.005	17	0.05	<0.00005	0.004	2	7.7	10	170	53	650	95
	17/01/2017	0.71	<0.005	21	<0.0005	170	<1	1900	<0.005	<0.005	0.025	0.025	0.025	6200		<5	1.5	<0.005	100	0.051	<0.00005	<0.005	2.9	7.2	41	1100	380	3500	27
	1/02/2017	1	<0.001	26	<0.0001	31	<1	230	0.004	0.01	0.045	0.045	0.046	850			1.6	0.002	11	0.022	<0.00005	0.002	2.3	7.5	8.3	100	48	440	50
	25/03/2017	4.8	<0.001	28	<0.0001	41	<1	340	0.006	0.008	0.017	0.028	0.026	1400	150	<5	2.3	0.005	12	0.025	<0.00005	0.003	1.6	7.5	9.8	200	77	710	47
TGMSW05	13/12/2016	2.4	<0.001	31	<0.0001	40	<1	340	0.008	0.006	0.006	0.008	0.006	1300		<5	4	0.004	18	0.054	<0.00005	0.004	2.5	7.6	10	190	56	700	96
	17/01/2017	4.5	0.002	25	<0.0001	19	<1	200	0.013	0.009	0.02	0.02	0.02	750		<5	6.6	0.007	8.9	0.067	<0.00005	0.006	1.1	7.2	7.8	100	31	410	170
	1/02/2017	1.2	<0.001	28	<0.0001	30	<1	210	0.004	0.008	0.041	0.042	0.042	870			1.8	0.002	11	0.024	<0.00005	0.002	2.3	7.5	8.2	100	51	460	53
	25/03/2017	5.4	0.001	32	<0.0001	47	<1	380	0.006	0.006	0.008	0.01	0.008	1500	170	<5	2.5	0.003	13	0.032	<0.00005	0.003	0.8	7.5	10	220	91	800	42
TGMSW06	13/12/2016	3.7	<0.005	26	0.0009	130	<1	1700	0.012	0.008	<0.004	<0.004	<0.004	5800		<5	6.7	0.011	90	0.21	<0.00005	0.009	2.9	7.4	33	980	300	3300	280
	25/03/2017	1.7	<0.005	21	0.0008	160	<1	1800	<0.005	0.017	0.054	0.058	0.057	6100	660	<5	1.4	0.005	64	0.1	<0.00005	<0.005	1.3	7.4	31	1000	360	3500	15
TGMSW07	13/12/2016	6.8	0.002	26	0.0001	33	<1	350	0.021	0.012	<0.004	<0.004	<0.004	1400		<5	12	0.012	20	0.15	<0.00005	0.01	1.2	7.7	10	200	63	700	310
	17/01/2017	10	0.003	34	0.0001	16	<1	75	0.026	0.019	<0.004	<0.004	<0.004	400		<5	14	0.017	8.1	0.14	<0.00005	0.015	0.8	8	7.4	48	30	340	520
	1/02/2017	1.9	0.001	26	<0.0001	38	<1	260	0.006	0.005	0.007	0.01	0.01	1000			3	0.004	12	0.047	<0.00005	0.003	2.2	7.5	8	130	73	550	98
	25/03/2017	3.4	<0.001	25	<0.0001	50	<1	380	0.004	0.006	0.01	0.012	0.011	1600	170	<5	1.5	0.002	11	0.028	<0.00005	0.002	0.5	7.5	9.5	220	110	840	36
TGMSW08	13/12/2016	2.8	<0.005	24	<0.0005	150	<1	1400	0.011	0.006	<0.004	<0.004	<0.004	5300		<5	5.5	<0.005	85	0.16	<0.00005	0.007	12	7.4	31	870	470	3000	110
	17/01/2017	13	0.002	36	<0.0001	13	<1	15	0.033	0.012	<0.004	<0.004	<0.004	130		<5	18	0.01	3.8	0.083	<0.00005	0.013	0.7	7.7	3.4	8.1	7	220	490
	25/03/2017	16	0.002	43	<0.0001	12	<1	5	0.039	0.013	<0.004	<0.004	<0.004	92	44	<5	21	0.011	3.4	0.096	<0.00005	0.016	0.4	7.9	4	5.2	3	380	310
TGMSW09	17/01/2017	11	<0.005	19	<0.0005	180	<1	2300	0.041	0.015	<0.004	<0.004	<0.004	7600		<5	20	0.025	99	0.25	<0.00005	0.019	4.2	7.2	40	1500	550	4300	360
	25/03/2017	7.4	0.003	43	0.0002	280	<1	2300	0.029	0.01	<0.004	<0.004	<0.004	7900	1300	<5	15	0.009	150	0.24	<0.00005	0.012	6	7.6	56	1500	800	5000	77
TGMSW10	13/12/2016	38	0.012	33	0.0001	9.4	<1	25	0.14	0.062	<0.004	<0.004	<0.004	190		<5	48	0.064	21	0.78	<0.00005	0.089	1.4	7.6	17	28	24	300	2000
	17/01/2017	13	0.006	25	<0.0001	6.8	<1	26	0.06	0.029	<0.004	<0.004	<0.004	190		<5	22	0.026	8.9	0.33	<0.00005	0.04	1	7.3	8.5	27	23	230	1000
	25/03/2017	1900	0.07	69	0.01	690	<1	2600	4.9	1.5	<0.004	<0.004	<0.004	9000	4500	<5	2800	1.5	670	21	0.0018	1.7	5.6	7.7	380	1600	870	5800	100000

Appendix 5: Water Quality Monitoring Methodology - Internal Audit

MEMORANDUM

Date: **14 October 2017**

To: Environment Team (Safety & Environment Department)

From: Sarah Brown

Subject: Monitoring Strategy Internal Audit

Groundwater and Surface Water

An internal audit of the water quality monitoring methodology outlined in the TGM Monitoring Strategy was undertaken against the *Australian Guidelines for Water Quality Monitoring and Reporting* (2000) in October 2017. The audit covered seven key aspects including:

1. monitoring preparation;
2. contamination prevention;
3. sample collection;
4. quality control and quality assurance;
5. sample storage and transport;
6. record management; and
7. laboratory analysis.

Table 1 below provides the actions to be undertaken following the audit and a summary of the audit findings for each of the key aspects. The completed audit table is provided in Appendix 1.

Table 1: Audit actions to be undertaken

Aspect	Action	Accountability	Due
Monitoring Preparation	Include the requirement to decontaminate equipment in the work instruction.	Environmental Officer	15/12/2017
Sample Collection	Include the requirement to comment on external factors in the work instruction.	Environmental Officer	15/12/2017
QAQC	Commence the practice of including a field blank in the monitoring suite.	Environmental Officer	15/12/2017

Monitoring Preparation

Over the past 12 months a number of procedures and work instructions have been put in place to improve the reliability of the sampling processes utilised across Tropicana Gold Mine (TGM). These include;

- Water Monitoring Sample Collection, Storage and Dispatch Work Instruction
- Water Monitoring Field Measurements.

Monitoring Preparation achieved 80% compliance in the audit.

Contamination Prevention

Contamination prevention is an area that requires additional attention.

Equipment decontamination could improve the reliability of sampling results. Currently, sampling equipment is not decontaminated at the completion of sampling campaigns. By triple rinsing equipment between sampling locations as well as utilising a decontamination product at the completion of monitoring campaigns the risk of contamination would be reduced greatly.

Contamination prevention achieved 66% compliance in the audit.

Sample Collection

Sample collection is undertaken well, although it is recognised there is some room for improvement. Monitoring staff could improve the overall validity of the sampling campaigns by commenting on external factors that may have the potential to impact on the monitoring results. These factors include weather (wind direction, temperature and rainfall) as well as physical characteristics (odour, foreign material and colour).

Sample collection achieved 76% compliance in the audit.

Quality Control and Quality Assurance

Quality Control and Quality Assurance (QAQC) requires further work to achieve the desired standard. Improvements could be implemented by providing the Laboratory with sample blanks to determine if the equipment, sample bottles or the surrounding environment are resulting in external contamination of the sample.

Quality control and quality assurance achieved 50% compliance in the audit.

Sample Storage and Transport

Sample storage and transport is undertaken to a very high standard. Every effort is made to align sampling with available transport, to ensure samples meet holding times, and are received by the laboratory appropriately.

Sample storage and transport scored 100% in the audit.

Record Management

Detailed Work Instructions are in place to ensure that all records are maintained to a very high standard.

Record management achieved 100% compliance in the audit.

Laboratory Analysis

Laboratory analysis covered aspects pertaining to the external laboratory. Some areas could be completed based on the laboratory's NATA accreditation; however more specific requirements were not incorporated into this audit, as they were outside the scope.

Laboratory analysis scored 100% in the audit (not including audit components which were not applicable).

Appendix 1: Completed Audit Table

Audited by:	Sarah Brown	**Date of Audit:**	13/10/2017
Supervisor:	Rosemarie Lane		

1	Monitoring Preparation	Compliance (place x in applicable box)			Observations/Findings/Comments
		Yes	No	N/A	
1.1	Is there a record of the sampling site locations	X			Map available of the environmental monitoring bores and the surface water collection points (sampling locations). A workspace has also been created in MapInfo which indicates where all monitoring locations are and can also be utilised in the field.
1.2	Sampling device is calibrated prior to each monitoring event		-	X	Water monitoring equipment is maintained as required.
1.3	Water quality parameter meter is calibrated prior to each monitoring event		X		The monitoring equipment is not calibrated prior to each monitoring event commencing. Equipment will now be required to be calibrated by SGS on site on a monthly basis and sent off site for a service/calibration every 6 months.
1.4	Field staff have had sufficient training and experience to undertake the sampling	X			A Verification of Competency (VOC) is conducted on all employees prior to being allowed to conduct field monitoring alone.
1.5	All equipment and field instruments are kept clean and in good working order	X			Stored within an air-conditioned sea container, in storage containers, away from exposed sunlight and dust.
1.6	Sampling protocols and procedures in place for field sampling, transport and storage	X			A very detailed work instruction exists for the sampling, transport and storage of samples.
1.7	Procedures provide detailed descriptions for collecting, labelling, transporting and storing samples and the necessary ancillary field data.	X			A very detailed work instruction exists for the collection, labelling, transporting and storage of samples.
1.8	Specific procedures and protocols have been developed and specify the sample collection device, type of storage container, preservation procedures, type and numbers of quality control samples to be taken.	X			See above.

1.9	Exact locations of sampling sites and any sub sites are recorded in the sampling protocol.	X			Sampling locations including maps, map info files and gpx files of monitoring locations and the tracks to the monitoring locations.
1.10	Procedures are in place for handling, tracking and correcting data	X			There is now a detailed work instruction in place to ensure that correct handling, tracking and storage of data.
		8	2	0	80%
		8	/	10	
2	**Contamination Prevention**	**Compliance (place x in applicable box)**			**Observations/Findings/Comments**
		Yes	**No**	**N/A**	
2.1	Field measurements are made on separate sub-samples of water (not in the laboratory samples)	X			Field measurements are taken using separate sub-samples of water.
2.2	Only sample containers supplied by the analytical laboratory are utilised	X			All sample containers are supplied by SGS laboratory.
2.3	The insides of containers do not come into contact with hands or objects	X			There is no direct contact with the insides of containers.
2.4	Sample containers are kept in a clear environment away from dust and dirt	X			Samples are stored in containers within a sea container.
2.5	Sampling staff use plastic disposable gloves when handling sample containers at every stage during sampling.	X			The requirement to wear gloves in contained within the Work Instruction.
2.6	Sampling equipment including containers, water quality parameter probes, pumps and bailers are rinsed with deionised water in between samples to prevent cross contamination.		X		Water Quality Probes and bailers are not decontaminated between sampling campaigns.
		5	1	0	83%
		5	/	6	

Actions to be added to In Control			
Ref	**Action**	**Accountability**	**Due Date**
48660	Include a requirement to calibrate the Water Quality Meter on a monthly basis.	Environmental Officer	15 December 2017
48660	Include a requirement to provide the Water Quality Meter to an external laboratory for servicing and calibration every 6 months.	Environmental Officer	15 December 2017
48660	Include the requirement to decontaminate equipment in the work instruction.	Environmental Officer	15 December 2017
48660	Include the requirement to comment on external factors in the work instruction.	Environmental Officer	15 December 2017
48660	Include a section on the field sheet to allow for the recording of external factors.	Environmental Officer	15 December 2017
48660	Commence the practice of including a field blank in the monitoring suite.	Environmental Officer	15 December 2017

Appendix 6: Environmental and Heritage Inspection Notifications (EINs)

Environmental and Heritage Inspection Notification

Proposal of Work: PWSB Bore Drilling

Release Date: Pre-release Inspection

Date of Inspection: 15/12/2016

Completed By: Dylan Tucker - Environmental Officer

Findings:

An Environmental and Heritage inspection was conducted on 15/12/2016 to assess the clearing of tracks and drill pads for bore drilling.

- 3 bores to be drilled
- 1.42km of clearing for access tracks (4m)

An initial desktop survey was conducted prior to field operations, to establish whether there are any environmental values and avoidance areas within the program clearing area. Field inspections were undertaken on foot and utilising a Panasonic tough-pad with GPS capabilities.

There are no recommended changes as a result of the on ground environment and heritage inspection.

Specific findings are presented below:

EIN - PWSB conducted January 2016	
Vegetation Type / Clearing Type	*Eucalyptus gongylocarpa* (marble gum) over *Triodia desertorum* or *T. basedowii* 50% Mulga woodland over spinifex – 50% There were no priority flora or fauna identified within the clearing boundary during this inspection
Clearing Width	All maintenance strips are 10m wide and clearly flagged by survey to prevent over clearing.
Soil Type	Sand/ sand over calcrete
Heritage Considerations	None discovered in desktop search or on ground EIN

Special Considerations:

Heritage Sites

A desktop review identified no archaeological, ethnographic or heritage sites within the proposed clearing areas. However there are sites of high ethnographic value within the region. Care should be taken when clearing and traveling in the area to ensure these sites are not disturbed. Always drive on gazetted tracks and report anything that could be significant to the Tropicana Sustainability team.

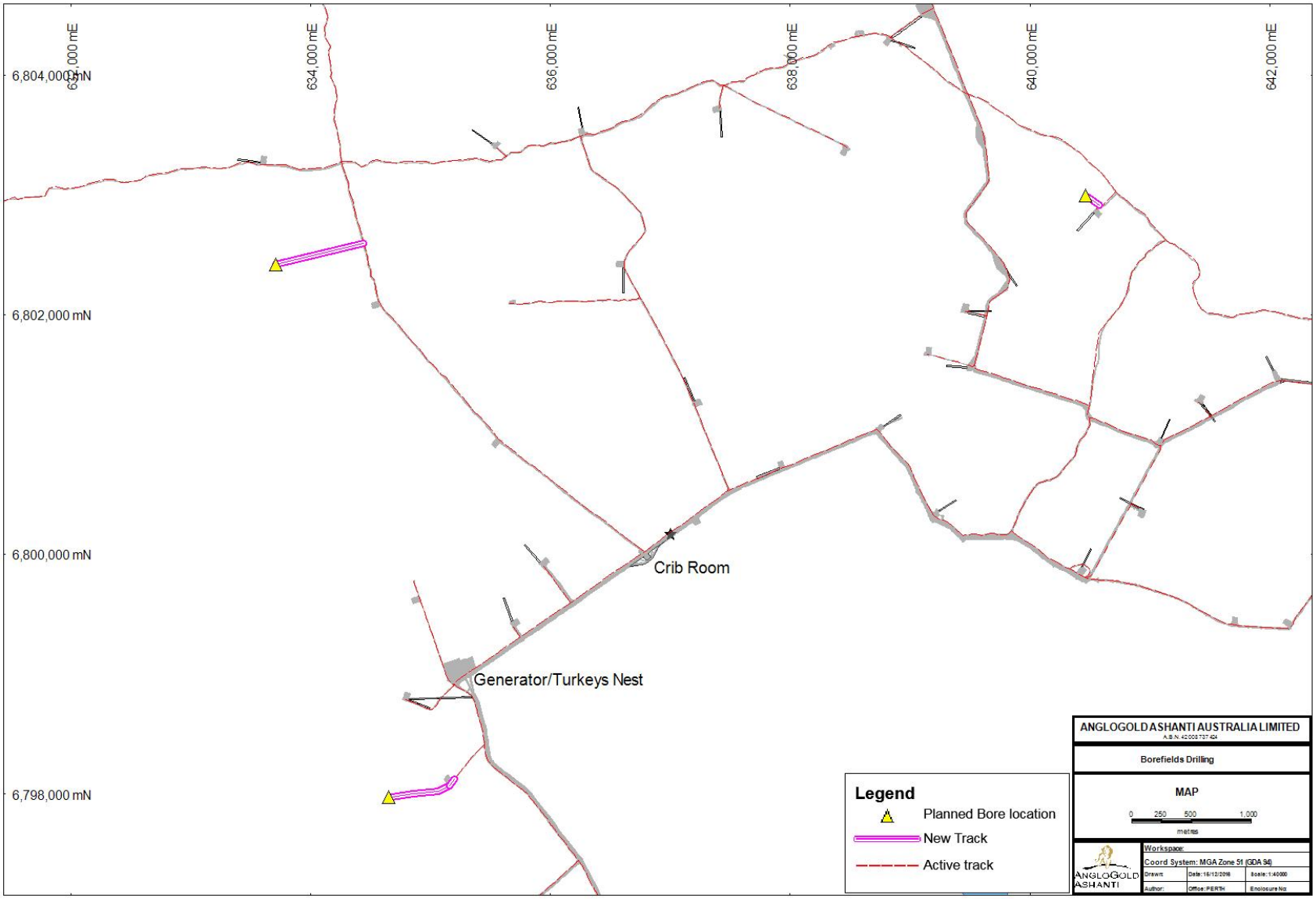
Threatened Fauna Sites

No threatened fauna species were identified during the field inspection. Priority 4 fauna species *Ardeotis Australia* (Australian Bustard) is often observed in the PWSB area. Extreme care should be taken when driving within close proximity to prevent any interactions with this large ground dwelling species.

Plate 3: *Ardeotis australis* (Australian Bustard)

Threatened Flora

No Threatened Flora was identified during this environmental Inspection



Risk map for the PSWB maintenance clearing

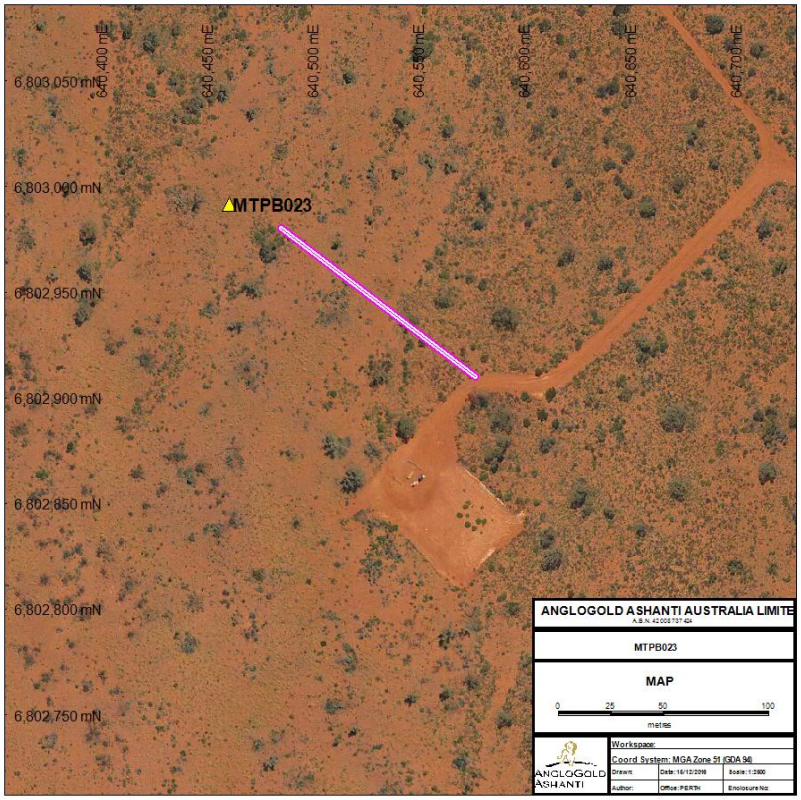


Figure 1 Close up map for proposed bore MTPB023

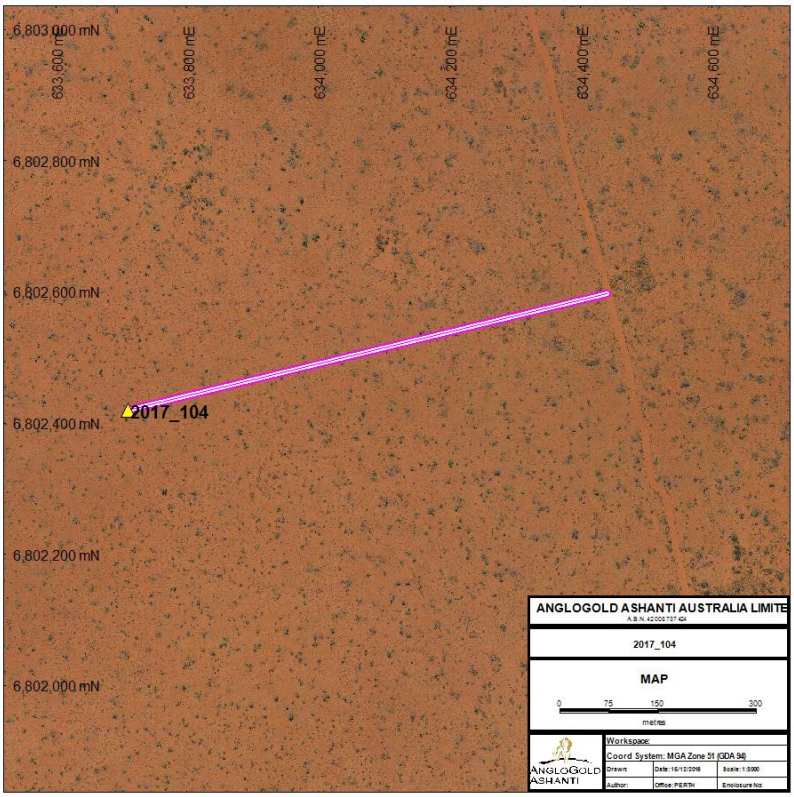


Figure 2 Map for 2017_104

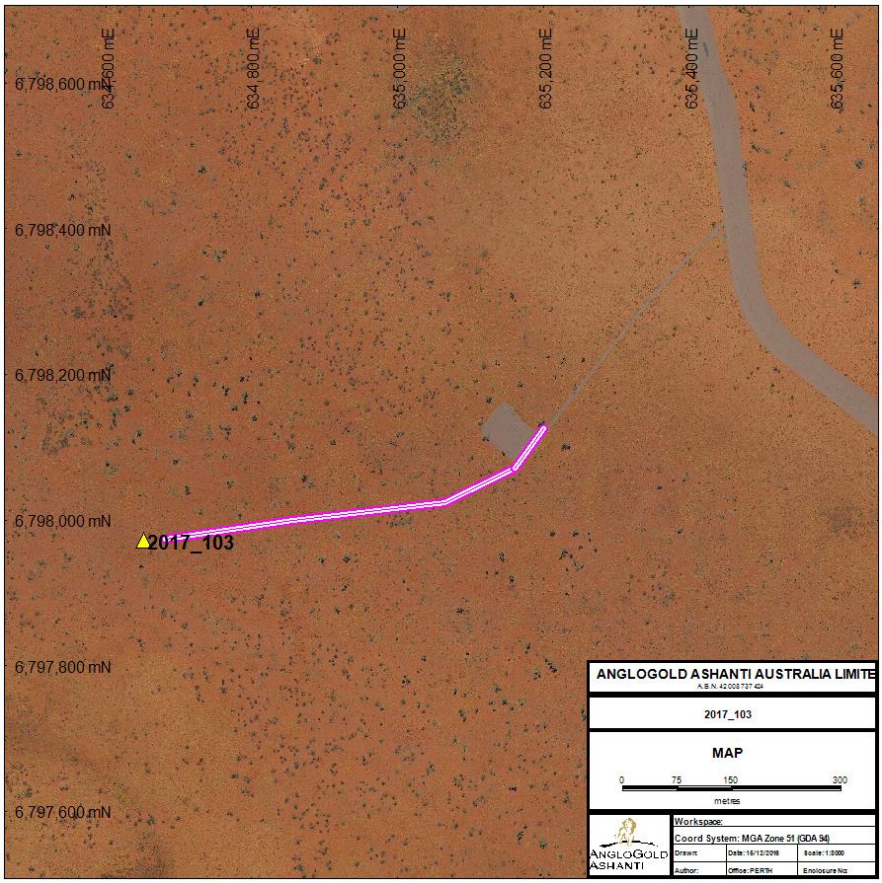


Figure 3 Map for 2017_103

Environmental and Heritage Inspection Notification (EIN)

Proposal ID: *DP1628*

Proposal of Work: *AC drilling at Don Pedro – Sean Beavon Exploration Geologist*

Release Date: *Pre-release inspection*

Date of Inspection: *01/09/2017 – 02/09/2017*

Completed By: *Nicholas Lacy – Geology Technician*
Jane Dunne – Environmental Officer
Cameron Wells – Geology Leading Hand

Summary Table for Drill Proposal

Safety considerations	Prospect Location: ~8km SW of Tropicana Gold Mine Camp location: Conducted out of the TGM Village Nearest emergency points: TGM Medical Clinic and TGM Village Medical Clinic
Environmental considerations	Fauna values: No priority fauna were identified during this inspection Flora values (links to IMS): No priority flora were identified during this inspection Buffers: Nil Clearing method: Raised blade – Bucket touch (3m wide)
Heritage considerations	Heritage values: No heritage values were identified during this inspection Buffers: Nil

Summary of Proposed program:

An AC drilling program to be drilled by Bostech Drilling Australia has been proposed at Don Pedro Tropicana Group 1 prospect in tenement E39/1306 and M39/1096. Don Pedro is approximately 8km SW of Tropicana Gold Mine.

The proposed program consists of:

- 20 AC holes.
- Clearing of access tracks and reopening rehabilitated tracks (3m wide).

Recommendations

An environmental and heritage inspection was conducted for the Don Pedro drilling program on the 01/09/2017 – 02/09/2017. Some environmental issues were identified and modification to the initial planned program were recommended. These modifications have been finalised, therefore the program can proceed as planned in accordance with the attached Map.

Special Considerations:

Safety:

- Sand dunes and clay pan salt lakes increase the risk of becoming bogged, it is recommended that drivers stay on tracks and use low range four wheel drive when required
- Nearest emergency points include the TGM Village and Site Medical Clinics

Threatened Flora:

- No priority or threatened flora were identified during this field inspection.

Threatened Fauna:

- No priority of threatened fauna were identified during this field inspection.

Other Environmental Concerns:

- The northern drill lines are located within thick Mulga Woodlands which is a known habitat for Mallefowl. If Mallefowl mounds are discovered during clearing please contact the Environmental Team.
- When clearing, methods to include raised blade or bucket touch.

Heritage:

- No heritage values were identified during this inspection.

Operational Considerations

- The southern drill lines are between sand dunes, although these drill lines avoid the adjacent sand dunes some areas of this track include sandy inclines. See below figure 1 of sandy inclines.

Figure 1: Sandy slopes

- The northern drill lines are through thick Mulga Woodland.
- All rubbish and hydrocarbon spills to be removed upon completion of drilling.
- Upon completion of drilling, the AC drill holes are to be rehabilitated to level AC1 in accordance with the Exploration Rehabilitation Procedure.
    - The hole is plugged at a minimum of 40 cm below surface using an 80 mm diameter drill plug filled with soil.
    - The hole is backfilled and mounded above the plug with low permeability material (e.g. clay or oxide drill cuttings) to promote water shedding away from the drill hole.
    - Any available topsoil / growth medium is spread over the mounded drill hole.

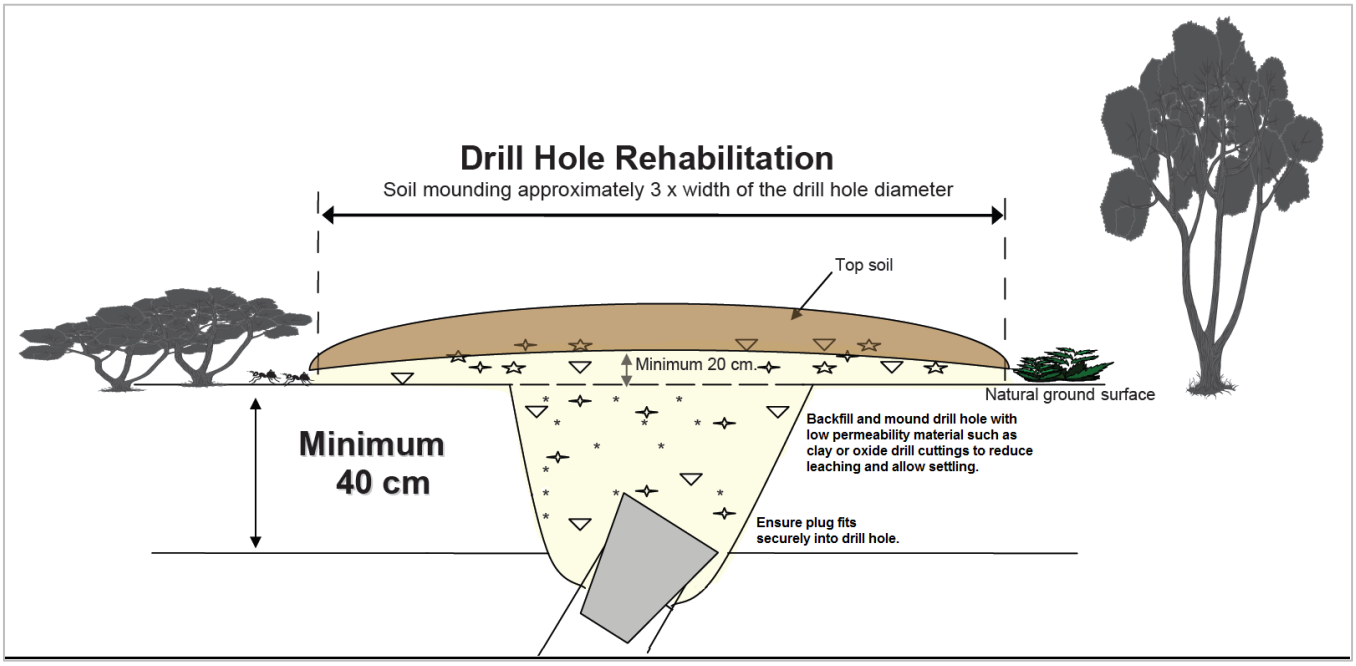


Figure 2: AC Drill Collar Rehabilitation Spec

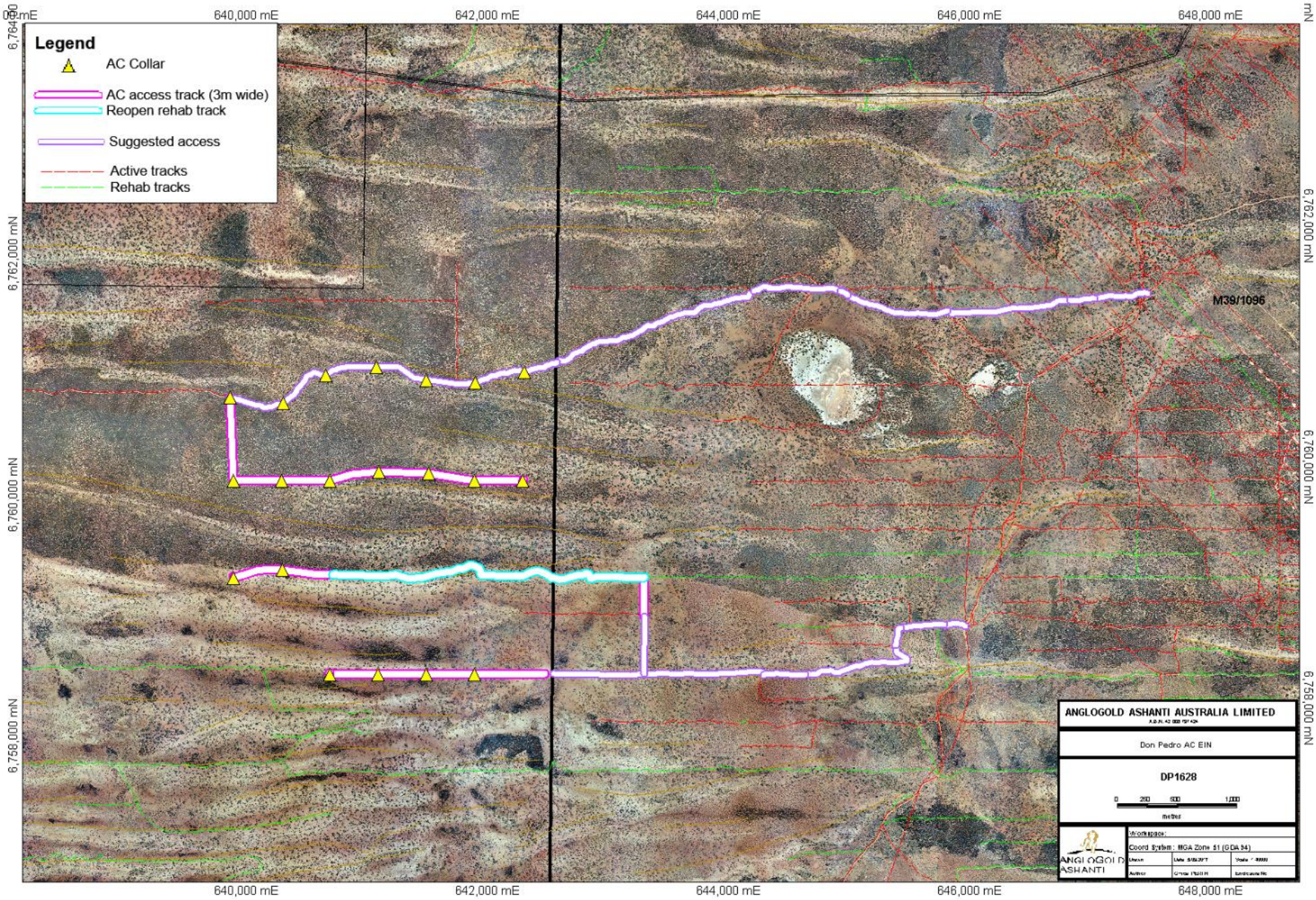


Figure 3 Don Pedro EIN Map

Appendix 7: Threatened Species and Communities Management Strategies – Internal Audit

ANGLOGOLD ASHANTI AUSTRALIA

TGM Threatened Species and Commmunities Management Strategy
Internal Audit - Environmental Compliance

Audit undertaken by:	Sarah Brown	**Date of Audit:**	13/10/2017
Supervisor:	Rosemarie Lane	**Communicated:**	

1	**Clearing/ Earthworks**	**Compliance (place x in applicable box)**			**Observations/Findings/Comments**
		Yes	**No**	**N/A**	
1.1	Disturbance to native vegetation is minimised with clearing confined to the minimum area practicable.	X			All clearing undertaken is approved through Ground Disturbance Permit (GDP) boundaries to minimise disturbance to native vegetation.
1.2	All areas requiring clearing are clearly delineated.	X			All clearing is clearly delineated within GDP application form.
1.3	Declared Rare Flora (DRF) within 50 m of disturbance areas are visibly demarcated.	X			During construction DRF were demarcated. Post the construction phase, known DRF in the Project area have been delisted. Flagging tape is used to demarcate Priority Species to allow for easier identification by the Exploration team.
1.4	All infrastructure (including the access roads) has/will been designed and located to avoid impacts on all known populations of DRF.	X			During construction DRF were demarcated. Post the construction phase, known DRF in the Project area have been delisted. Prior to clearing being undertaken, a GDP is required. The GDP requires specific details of the proposed disturbance. During the GDP assessment process, a desktop assessment is undertaken to determine if there will be any impacts to DRF and whether the proposed disturbance can be relocated to avoid the DRF. A site inspection (pre clearing inspection) may also be undertaken in areas outside the Project Development Envelopes to ensure disturbance to DRF is avoided.
1.5	Infrastructure areas have/will be designed and located to avoid known locations of Priority flora where reasonably practical.	X			Prior to clearing being undertaken, a GDP is required. The GDP requires specific details of the proposed disturbance. During the GDP assessment process, a desktop assessment is undertaken to determine if there will be any impacts to priority flora and whether the proposed disturbance can be relocated to avoid the priority flora. A site inspection (pre clearing inspection) may also be undertaken in areas outside the Project Development Envelopes to avoid disturbance to priority flora where practical.
1.6	Surface water diversion systems will be incorporated into the design of the Operational Area to minimise impacts to surface water flow.	X			Roads located on high points, culverts installed on site access roads to allow water to flow underneath the road to prevent interference with sheet flow.
1.7	The operational area layout has been designed to minimise impacts to surface water flow	X			Surface water diversions in place around site to intercept surface water and prevent offsite impacts. Waste Rock Landforms have been designed with a toe drain and collection point to prevent sedimentation down stream.
1.8	Infrastructure has been located to minimise fragmentation of important habitat.	X			Environmental values were taken into consideration during project footprint design, minimising impacts to avoidance areas. For example, the TSF design was re-evaluated with the original TSF design comprised of valley fill utilising the nearby sand dunes as containment walls. The sand dunes however were subsequently recognised as significant habitat, and the TSF design was re-evaluated to prevent impact to the sand dunes.
1.9	Fire protocols have been implemented to reduce the risk of fire.	X			Tropicana works activity with and regularly collaborates with the Department of Parks and Wildlife (DPaW) to determine suitable fire regimes and requirements for fuel reduction burns. The risks associated with fire are management in accordance with the AGAA Fire Management Plan.
1.10	Fire breaks have been established adjacent to high risk areas	X			Fire breaks located in the following locations: Village, Aerodrome, Waste Water Treatment Facility, Waste Management Facility, Explosives Magazine and Exploration camp. Firebreaks will be installed where appropriate if there is an imminent risk of fire.

1.11	No extensions to the pit or amendments have been undertaken without further troglobiotic surveys			X	No extensions or amendments to the pit has been undertaken in 2017.
1.12	Disturbance to critical habitat has been avoided (sand dune systems suitable for Marsupial Moles, Sandhill Dunnarts and the Mulgara).	X			Environmental values were taken into consideration during project footprint design, minimising impacts to critical habitat. The Environmental and Heritage Inspection (EIN) and ground disturbance permitting (GDP) processes aim to minimise impacts to environmentally sensitive areas.
1.13	Disturbance to possible Malleefowl and Sandhill Dunnart habitats has been minimised where practicable (including areas of spinifex unburnt between eight and 38 years).	X			Infrastructure locations and project footprint has been placed to avoid and minimise disturbance to significant habitats including sand dunes and areas of unburnt spinifex.
1.14	Locations of critical threatened fauna habitat have been avoided (including Mallee fowl mounds, Bustard nests and sand dunes).	X			Infrastructure locations and project footprint has been placed to avoid and minimise disturbance to significant habitats including sand dunes and areas of unburnt spinifex.
1.15	Locations of Priority Ecological Communities (PEC) have been avoided where practicable.	X			Environmental values were taken into consideration during project footprint design, minimising impacts to PEC. The Environmental and Heritage Inspection (EIN) and ground disturbance permitting (GDP) processes aim to minimise impacts to environmentally sensitive areas through the identification of PEC locations in relation to proposed disturbances.
1.16	Removal of large mature habitat trees has been avoided (particularly Marble Gum) where reasonably practicable.	X			The project footprint was placed to avoid the removal of mature habitat trees. During clearing, large trees were marked and stockpiled seperately for use in rehabilitation.
1.17	Rehabilitation is undertaken as soon as is practicable.	X			Borrow pits along the access road have been rehabilitated. Ground Zero area has been rehabilitated. A rehabilitation plan will be developed for the mining area to enable and plan progressive rehabilitation of landforms.
1.18	Rehabilitation areas are monitored for presence of weeds	X			Annual broadscale weed inspections are carried out as part of the Flora Survey conducted in September\October. Currently limited rehabilitation areas in place. Following the commencement of progressive rehabilitation, a rehabilitation plan including monitoring for weeds will be implemented.
1.19	Information on current flora and fauna conservation status is maintained	X			The Threatened Species and Community Management Plan was updated to reflect changes in listings as part of the 2017 strategy review. Records are reviewed on an annual basis and updated as required.
1.20	Site induction includes information on conservation significant flora, vegetation, fauna and habitat.	X			Site induction covers content on flora and fauna in the region. All employees are provided with access to a handbook which provides information on threatened species (flora and fauna) at TGM.
1.21	Open trenches are cleared and inspected for fauna at sunrise and sunset.			X	Construction of the Process Water Supply Borefield was completed in 2012/13.
1.22	Trenches do not exceed a length capable of being inspected by fauna clearing person.			X	Construction of the Process Water Supply Borefield was completed in 2012/13. Trenches inspected were of a length appropriate that the fauna clearing person could get to the trenches within the required timeframes (three hours after sunrise and three hours after sunset).
1.23	Fauna refuges and/or egress ramps are placed in the trench at 50 m intervals			X	Construction of the Process Water Supply Borefield was completed in 2012/13.
1.24	Report on fauna management following trenching activities has been produced.			X	Trench inspection fauna report submitted to the OEPA in June 2013.
		19	0	5	
		19	/	19	100%

2	Environmentally Hazardous Substances	Compliance			Observations/Findings/Comments
		Yes	No	N/A	
2.1	The placement of storage, re-fuelling, handling and disposal facilities avoids critical habitat	X			The project footprint was placed to avoid critical habitat
2.2	All pipelines are buried or bunded, have leak detection systems and automatic cut off systems	X			Pipelines are buried or bunded. For those pipelines that do not have leak detection system in place (Low environmental risk eg. pit dewatering), visual inspections are undertaken.
2.3	The pipeline corridor to the Minigwal borefield avoids threatened or conservation significant species	X			Designed to avoid critical habitat - minimise impact zones.
2.4	Hydrocarbons and chemicals are stored as per site procedures and Australian Standard 1940	X			Facility inspections and audits are undertaken regularly to ensure hydrocarbons and chemicals are stored appropriately.
2.5	Dangerous Goods licensing covers all hazardous materials on site	X			Tropicana Gold Mine currently holds Dangerous Goods Licence # DGS020989. Chemical request process ensure that the Dangerous Goods Licence is considered prior to the chemical being approved for use on site.
2.6	Evidence of appropriate spill containment at refuelling bays and bulk storage facilities	X			Spill kits are located at refuelling bays and at bulk storage facilities
2.7	Evidence of implementation of Emergency Response Procedures for hydrocarbon spills	X			ERT Action Sheet 6 - Diesel Spill
2.8	Evidence of spill kit and emergency response training records for relevant staff.	X			Spill training is delivered as part of the TGM General Induction and provdes information on spill kits with a specific question in the assessment. The ERT are trained to a higher level and these modules are part of a National Certification. Records are held by ERT.
		8	0	0	
		8	/	8	100%

3	General Waste	Compliance			Observations/Findings/Comments
		Yes	No	N/A	
3.1	Housekeeping and strict waste management practices	X			Waste management practices are in place, although further education of the workforce may be required.
3.2	All domestic waste is disposed within the licensed waste management facility	X			Yes - the Waste Management Facility is contained on the prescribed premises license
3.3	All domestic rubbish bins have lids	X			Yes - wheelie bins with lids are utilised for domestic waste.
3.4	Waste stations are labelled for the appropriate segregation of waste (e.g. recyclables, general waste, hydrocarbon waste)	X			Yes - waste streams are managed by dedicated colour coded bins
3.5	Putrescible and inert waste is disposed of and covered within the licensed waste management facility.	X			Yes - the landfill is regularly maintained and contains putrescible and inert waste only.
		5	/	5	100%

4	Tailings	Compliance			Observations/Findings/Comments
		Yes	No	N/A	
4.1	The TSF design contains any potentially contaminated runoff, preventing uncontrolled discharge.	X			The TSF design allows for an operational freeboard of 500mm. The completion of the Stage 4-5 TSF Wall Lift provides for a current freeboard of approximately 5m.
4.2	WAD CN levels in free water on the TSF do not exceed 50 mg/L			X	TGM has undertaken baseline and causal studies to determine the risk to wildlife of WAD CN levels greater than 50mg/L when the salinty is greater than 50,000 mg/L. The studies confirmed that hypersalinity is an effective mechanism to afford wildlife protection and this managment strategy has been peer reviewed and submitted to the International Cyanide Management Code (ICMC) as a subset of the certification documention. As such, this audit criteria is no longer applicable and will be removed as part of the 2017 review.
4.3	Compliance with the International Cyanide Management Code	X			Cyanide Code Certification was granted in August 2017.
4.4	Animal access is restricted	X			Animal access around the TSF is managed by a combination of fencing, steep sided landform precluding fauna movements and mining activities. However, animals have entered the TSF over the past 12 months. Freshwater fauna ponds have been placed in locations outside of the TSF and these have been found to attract fauna to these ponds preferentially away from the TSF.

4.5	The TSF Management Strategy has been implemented	X			Tailings Storage Facility Operating Manual implemented to privde TGM personnel with information to operate the TSF in line with design parameters.
4.6	TSF design limits seepage through the installation of a basin liner, seepage recovery system and water recovery.	X			Seepage Recovery System installed. Compacted clay liner and HDPE liner underlying the decant. (300 mm liner).
4.7	Operation of TSF limits volume of water stored on the TSF at any one time (through re-use)	X			Decant water is returned to the Process Plant
		6	0	1	
		6	/	6	100%

5	Dust	Compliance			Observations/Findings/Comments
		Yes	No	N/A	
5.1	Evidence of implementation of the CEMS and OEMS	X			TGM is certified against ISO14001.
5.4	Disturbance is minimised and progressive rehabilitation undertaken to reduce the potential for dust generation from cleared areas.	X			Disturbance is undertaken progressively to minimise dust generation. Progressive rehabilitation will be undertaken.
5.6	Road speeds are limited to reduce dust generation.	X			The road speeds on site do not exceed 60 km/hr. Access road permits speed up to 80 km/ hr. All employees are required to drive to the conditions.
5.5	Growth medium stripping and clearing activities are undertaken in appropriate weather conditions	X			Yes, growth medium is stripped in dry conditions only.
5.6	Dust suppression techniques are implemented.	X			Dust suppression, including water carts and conveyor sprinklers/sprayers are utilised to reduce dust generated onsite.
		5	0	0	
		5	/	5	100%

6	Noise/ Vibration	Compliance			Observations/Findings/Comments
		Yes	No	N/A	
6.1	Noise levels acceptable	X			Compliant with Noise Regulations.
6.2	Vibration associated with blasting is being controlled	X			Vibration is localised to the Active Mining Area
		2	/	2	100%

7	Water Sources/ Storage	Compliance			Observations/Findings/Comments
		Yes	No	N/A	
7.1	Water storage areas are fenced	X			Twin turkeys, Kamikaze Turkeys nest, WWTP ponds and Process Water Ponds are fenced with lockable gates
7.2	Fauna egress and/or nets have been incorporated into permanent water storage sites	X			Scramble mats and or nets are installed. The majority ponds have a textured HDPE liner.
7.3	Evidence of fauna deterrent methods	X			Fencing in place, egress and artificial water ponds in place to preferrentially attract fauna to these ponds in lieu of the TSF.
		3	0	0	
		3	/	3	100%

8	Erosion/ Sedimentation	Compliance			Observations/Findings/Comments
		Yes	No	N/A	
8.1	Routine inspections of erosion and sediment control structures	X			Inspection of site diversions and drains and sediment traps on landforms is undertaken in conjunction with surface water monitoring post significant rainfall events.
8.2	Evidence of stormwater drains within the operational area.	X			Large diversion drain around site.
8.3	Installation of an effective diversion system to separate clean and dirty water	X			Large diversion drain around site.
8.4	Evidence of dust control measures	X			Dust suppression measures in place - water carts, sprinklers on stockpiles.
		4	0	0	
		4	/	4	100%

9	Terrestrial Ecosystems - Fire Regimes	Compliance			Observations/Findings/Comments
		Yes	No	N/A	
9.1	Flammable liquids are stored appropriately	X			Flammable Liquids are stored as per Dangerous Goods License requirements.
9.2	Fire protocols have been implemented to reduce the risk of fire	X			Tropicana works activity with and regularly collaborates with the Department of Parks & Wilflife (DPaW). Fire activity is monitored by the Emergency Response Team.
9.3	Fire breaks have been established adjacent to high risk areas	X			Fire breaks located in the following locations: Village, Explosives Magazine, Aerodrome, Waste Water Treatment Facility, Waste Management Facility and Exploration Camp. Considering installing additional firebreaks - determining where these may be required. Firebreaks will be installed if there is an imminent risk of fire.
9.4	Designated smoking areas and provision of appropriate cigarette disposal.	X			Designated smoking areas established on site. Cigarette Butt disposal pockets available to all employees on site.
9.5	Collaboration with regulators to reduce the risk of fires	X			Tropicana works activity with and regularly collaborates with the Department of Parks & Wilflife (DPaW).
		5	0	0	
		5	/	5	100%

10	Terrestrial Ecosystems - Invasive Flora	Compliance			Observations/Findings/Comments
		Yes	No	N/A	
10.1	Invasive flora management procedures have been implemented	X			Vehicle Hygiene Certificate process has been successfully implemented. Targeted inspections of high risk areas post rainfall events.
10.2	Strict Vehicle hygiene practices implemented	X			All new vehicles/ equipment mobilised to site, require a notification form which provides details of the last service, location utilised and last clean. Upon arrival to site, the Environment team will inspect all equipment in order to grant approval for use.
10.3	Inductions and training promote awareness of weeds	X			Induction includes content on weeds and the strict vehicle mobilisation protocols. Toolbox topics and training materials target potential species.
10.4	Inspections are undertaken to record invasive flora infestation or changes in invasive flora.	X			Targeted inspections of high risk areas post rainfall events.
10.5	All soil brought to site is certified weed free.	X			No soil is brought to site. Washed white sand was brought in once for the Volleyball court in the Village.
10.6	Control and treatment measures for weeds are developed in consultation with DPaW where appropriate	X			In the case a significant weed was introduced on site, DPaW would be consulted regarding management, control measures and treatment programs
10.7	Clean seed and local seed only to be harvested for use in rehabilitation	X			Seed is harvested, cleaned and stored by a reputable company. Seed is only collected within a close range of TGM.
		7	0	0	
		7	/	7	100%

11	Terrestrial Ecosystems - Invasive Fauna	Compliance			Observations/Findings/Comments
		Yes	No	N/A	
11.1	No pets on site	X			TGM is a FIFO operation and no pets are allowed on flights/site.
11.2	Putrescible waste is disposed of in the licensed waste management facility	X			Waste landfill is managed and utilised in accordance with the PPL conditions and requirements.
11.3	Water storage facilities are Fenced	X			The TSF is partially fenced and all Turkeys Nests are fenced. The shallow freshwater fauna ponds outside the TSF (designed and strategically placed to attract fauna to the ponds over the TSF) have motion sensor camers to monitor fauna activity.
11.4	Stormwater management around site minimises ponding	X			Any surface water ponding observed post significant rainfall event is assessed and management actions taken as required.
11.5	Taps are maintained to prevent leaks	X			Planned maintenance, inspections and work requests for all pipelines, fixtures and fittings.
		5	0	0	
		5	/	5	100%

12	Terrestrial Ecosystems - Traffic	Compliance			Observations/Findings/Comments
		Yes	No	N/A	
12.1	Speed limits consider interaction with and impacts to threatened fauna	X			Signed speed limits (80kph Site Access Road, 60kph Site Roads). Site awareness on driving to conditions, dawn and dusk.
12.2	Infrastructure corridors have avoided bisecting critical habitats	X			Environmental values were taken into consideration during project footprint design, minimising impacts to critical habitats
12.3	Evidence of signs present in areas of threatened fauna habitat along roadsides		X		Signs have not been installed.
12.4	No evidence of unauthorised off road driving	X			Aerial survey, survey and reconciliation against approved ground disturbance activities is undertaken to verify there is no unauthorised off road driving.
		3	1	0	
		3	/	4	75%

13	Terrestrial Ecosystems - Increase Use of Region Nature Reserves	Compliance			Observations/Findings/Comments
		Yes	No	N/A	
13.1	Restrict vehicle movement and unauthorised use of the mine access road.	X			DIDO forms required to drive to site - requiring GM approval. 'No Unauthorised Access' signage installed at the start of and at various access points to the road.
		1	0	0	
		1	/	1	100%

Audit Score	**54**	**/**	**73**
		74%	

Actions to be added to In Control			
Ref	**Action**	**Accountability**	**Due Date**

Sign off

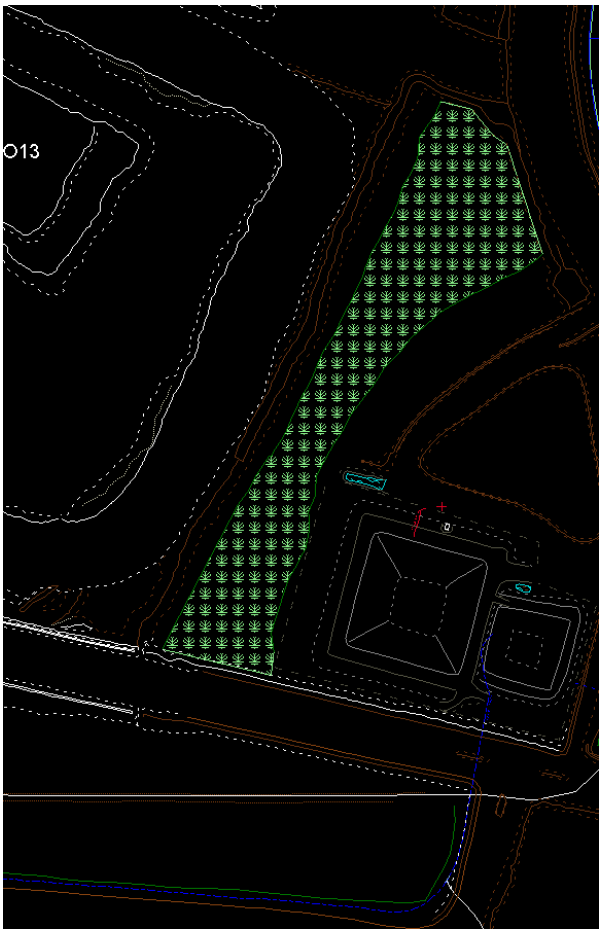
Role/Name	Name	Signature	Date
Environmental Advisor	Sarah Brown		
Environmental Superintendent:	Rose Lane		

Appendix 8: Ground Disturbance Permits (GDPs)

TGM Ground Disturbance Form SMA1 Extension_ Mine services Laydown area (TGM-GDP-)

Prior to completing a Ground Disturbance Permit the requestor shall verify that proposed activities are within approved boundaries using GIS Disturbance System and/or discussion with Sustainability Department.

Part A – Application Details (Applicant to complete Parts A, B and submit with a related Survey Request (where applicable) and spatial file to TGM Sustainability via TGMSustainabilitydata@anglogoldashanti.com.au for Part C onward)				
Date of Application: **25/11/2016**		Date/s of Proposed Disturbance: **01/12/2016**		
Expected Clearing Completion Date: **31/12/2016**				
Type of Activity	*Maintenance* (e.g. pruning, re-clearing of existing cleared area) ☐	*Mining /Waste Landform* (including: pits, borrow area, growth medium stockpiles) ☒	*Infrastructure* (including: pipeline/ building/ power line/ turkey's nest, accommodation, Workshop) ☐	*Access* (including: haul road, access roads) ☐
	Other (e.g. drainage,) ☐ *(Please specify:*			*Emergency* (e.g. fire break) ☐
Request Completed By: Michael Wells	Name: **David Pawlovich**	Department: **Mining**	Signature:	
Activity to be Conducted by: Macmahon	Department/Contractor: **Mining Alliance**			
Activity to be Supervised by: Macmahon	Name: **Colin Bald**	Department/Contractor: **AGAA Mining**	Signature:	

Part B – Scope of Ground Disturbance (applicant to complete)	
Location of the activities and purpose *(Description of proposed activities and location - tenement No.s. Attach a map showing location with coordinates. If space provided is not enough attach details as a separate document)* *Has consideration been given to using existing disturbed area?*	**Within the Active Mining Area** **This proposed GDP is for the expansion of a life of mine stockpile SF01. The area of disturbance is surround by cleared land.** 

ANGLOGOLD ASHANTI AUSTRALIA

TGM Ground Disturbance Form SMA1 Extension_ Mine services Laydown area (TGM-GDP-)

Independence Group

Are there any buried services or overhead powerline corridors within proximity of the proposed ground disturbance?	YES ☐ NO ☒ If Yes, refer to the Survey and/ or Electrical Department for additional permits.			
Describe the disturbance method	Drive Over ☐	Raised Blade ☐	Bucket Touch ☐	Full Clear >3cm ☒
Does this disturbance require any excavation greater than 150 mm or within proximity of overhead power corridor?	YES ☒ If Yes – consult survey and/ or electrical department and complete relevant approvals (i.e. Excavation and Penetration Permit)		NO ☐	
Area of disturbance	Attach plan with coordinates and/or spatial file of disturbance area – coordinates and spatial data to be in MGA94, Zone 51 or TGM Mine Grid L _____ m x W _____ m = **1.69 Hectares**			
Is the disturbance within proximity of any 'Avoidance Areas' / Heritage Site / Threatened Flora / Fauna locations? *If yes state distance from and type*	YES ☐ Type Distance from (m)		NO ☒	
If yes above describe management measures for 'Avoidance Areas" (if not enough room, please attach as a separate document)				
Growth medium collection details	YES ☒ NO ☐			
	If no, provide a reason:			
	If yes, what depth 100mm/300mm, other, document: **300 mm**			
	Stockpile location: **GM02**			
Vegetation collection details	YES ☒ NO ☐			
	If no, provide a reason:			
	Vegetation Types: **All Vegetation from cleared area except trees with a width over 300 mm they will be moved to separate stock.**			
	Stockpile location: **GM04**			
Part C- External Approval Assessment - assess proposed activities against actual disturbance and pending activities using the GIS Ground Disturbance Management System **(When completed Sustainability Dept to submit to Survey with Survey Request and associated spatial file)**				
Is proposed activity (type and area) within the approval limits?	YES ☒ NO ☐ *(If no discuss amendments with applicant to alter clearing area or reject if new external approval is required)* If Yes which one/s: PER ☐ Mining Proposal ☒ Approval id/s: **MP20141224**			
Part D-Flagging, Delineation and Survey (TGM Survey to complete and return to Sustainability Dept with plan and DXF of points set out in field via TGMSustainabilitydata@anglogoldashanti.com.au)				
Has the disturbance boundary been clearly delineated in the field?	YES ☐ NO ☒ Date:		Name: Signature:	
	Disturbance delineation activities that have been undertaken are: Flagging ☐ Pegging ☐ Minestar ☒			

Part E –Assessment and Approval (Sustainability Dept to complete and return to Applicant)					
Area Inspection	Area Inspection Completed: YES ☒ NO ☐, Date inspected: **28/11/2016 (Desktop)**				
	Clearing boundary in place	YES	☐	NO	☒
	Significant Environmental Values avoided	YES	☒	NO	☐
	Pre clearing photo's taken	YES	☐	NO	☒
Clearing Permit Reference	Enter clearing permit into GIS Clearing Management System if approval being granted. **PERMIT REFERENCE NUMBER: TGM-GDP-0170** **PERMIT EXPIRY: 31/12/2016**				

Approval Granted:	**Approval Not Granted:**
Date: **28/11/2016** Name: **Jesse Ober** Signature:  *Sustainability Manager or delegate authorised to sign*	Date_____ Name_____ Signature_____ *Sustainability Manager or delegate authorised to sign*

Approval Comments or Conditions	This GDP has been approved in accordance with the following conditions: 1. This GDP authorises clearing of up to **1.69 ha** for the expansion of the SF01 mine stockpile on **M39/1096**. 2. This GDP boundary is bound by existing cleared areas, only necessary clearing is to be undertaken, a staged approach is suggested to minimise dust emissions. 3. Growth medium is to be recovered to a depth of at least 300 mm and direct returned to any available rehabilitation areas or stockpiled within existing stockpiles. 4. Trees with a trunk diameter greater than 300 mm must be selectively harvested and stockpiled for use in rehabilitation. 5. A survey pick up of the cleared area must be undertaken and submitted to TGMSustainabilityData@AngloGoldAshanti.com.au 6. Any hydrocarbon spills are to be cleaned up immediately. Contaminated soils can be disposed of within the bioremediation facility. Please contact the Environment Team prior to disposing of contaminated soils. 7. This GDP does not provide authorisation for any additional permits that may be required (such as excavation and penetration permit). 8. This GDP Permit must be signed by the GDP requestor and supervisor acknowledging they have read and understand all of the conditions outlined in this GDP.
GDP Requestor Review of Conditions	Date: Name: Signature:

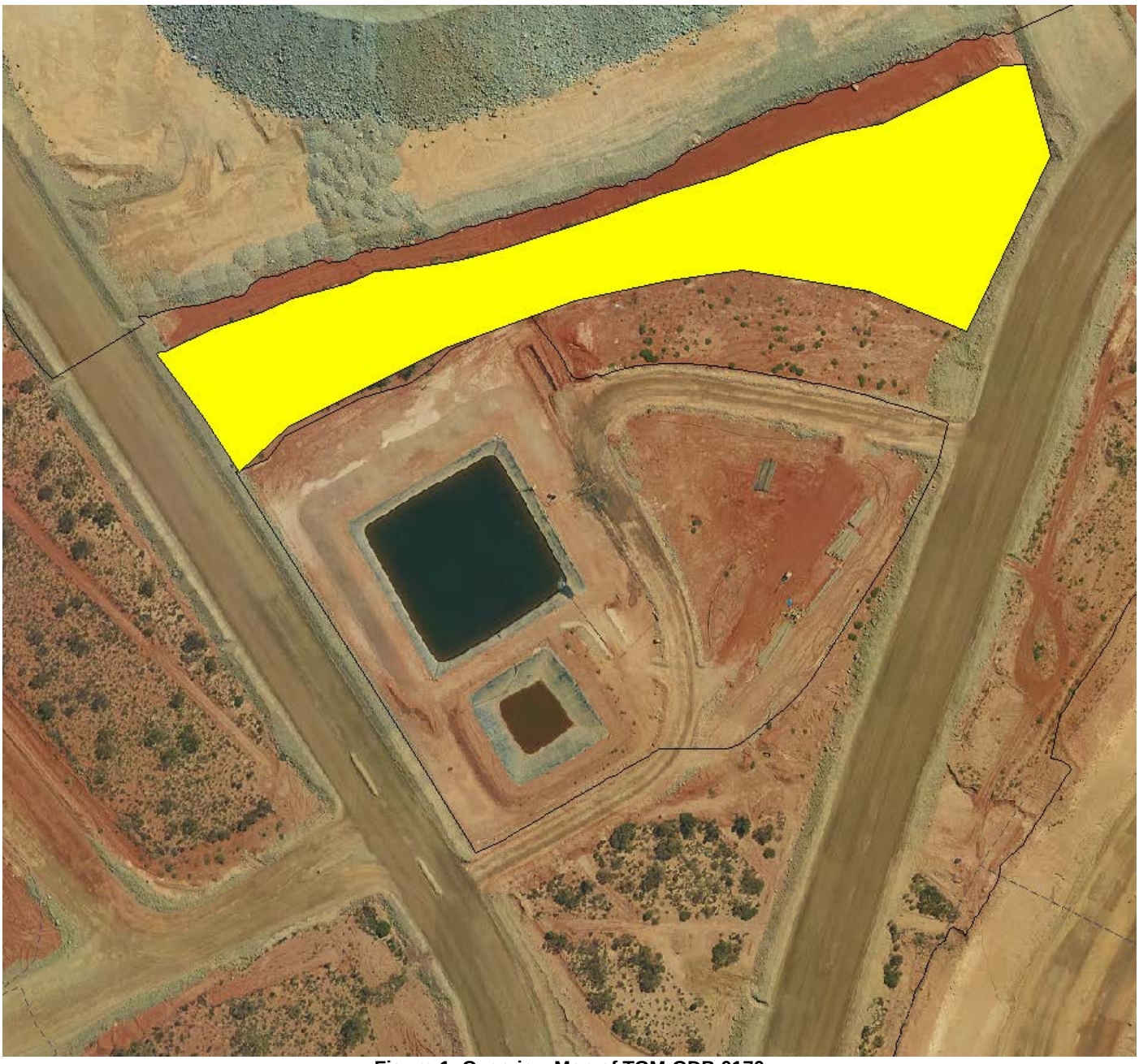


Figure 1: Overview Map of TGM-GDP-0170

Part A – Application Details (Applicant to complete Parts A, B and submit with a related Survey Request (where applicable) and spatial file to TGM Sustainability via TGMSustainabilitydata@AngloGoldAshanti.com for Part C onward)

Date of Application : 23/05/2017		Date/s of Proposed Disturbance: 23/06/2017		
Expected Clearing Completion Date: 31/12/2017				
Type of Activity	*Maintenance* ☐	*Mining /Open pit* ☒	*Infrastructure* (including: pipeline/ building/ power line/ turkey's nest, accommodation, Workshop) ☐	*Access* (including: haul road, access roads) ☐
	Other (e.g. drainage,) ☐			*Emergency* (e.g. fire break) ☐
Request Completed By:	Name: Duncan Wells	Department: Mining	Signature:	
Activity to be Conducted by:	Department/Contractor: Mining/Macmahon			
Activity to be Supervised by:	Name: Mine 5/Projects 2	Department/Contractor: Mining/Macmahon	Signature:	

Part B – Scope of Ground Disturbance (applicant to complete)

Location of the activities and purpose:

Clearing for Havana South Pit shell **New clearing (Open Pit) : 39.247ha (Figure 1)**

Land use Change: (See Figure 2)

Land use change	ha
Access Road / Tracks	0.497614
Bore Infrastructure	0.0614945
Borrow Pit	7.49002
Exploration	2.2698322
Haul Road	4.603706
Waste Landform	0.117837

Figure 1: Disturbance Area

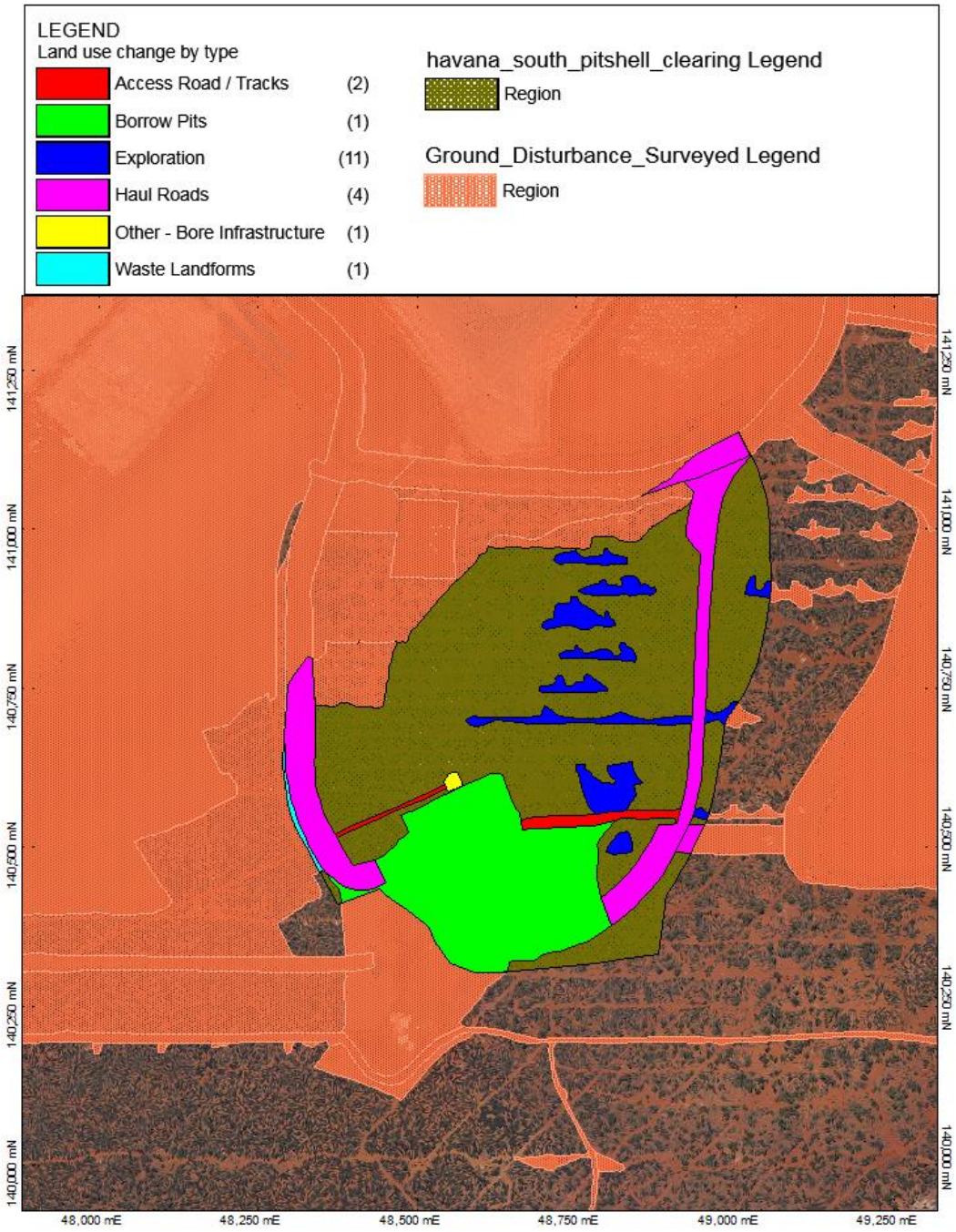


Figure 2: Land use changes

Describe the disturbance method	Drive Over ☐	Raised Blade ☐	Bucket Touch ☐	Full Clear >3cm☒
Does this disturbance require any excavation greater than 150 mm or within proximity of overhead power corridor?	YES ☐ If Yes – consult survey and/ or electrical department and complete relevant approvals		NO ☒	
Area of disturbance	**39.24 ha of open pit see figures**			
Is the disturbance within proximity of any 'Avoidance Areas' / Heritage Site / Threatened Flora / Fauna locations?	YES ☒ Type Sandhill Dunnart Habitat Distance – small portion falls within		NO ☐	

If yes above describe management measures for 'Avoidance Areas"	Area is already engulfed by waste landform.	
Growth medium collection details	YES ☒ NO ☐	
	If no, provide a reason:	
	If yes, what depth 100mm/300mm, other, document:	
	Stockpile location:	
Vegetation collection details	YES ☒ NO ☐	
	If no, provide a reason:	
	Vegetation Types Large trees / Scrub – Shrubs / Mixed, document:	
	Stockpile location: GM06	

Part C- External Approval Assessment - assess proposed activities against actual disturbance and pending activities using the GIS Ground Disturbance Management System

(When completed Sustainability Dept to submit to Survey with Survey Request and associated spatial file)

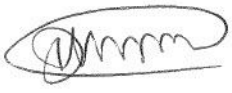
Is proposed activity (type and area) within the approval limits?	YES ☒ NO ☐ *(If no discuss amendments with applicant to alter clearing area or reject if new external approval is required)* If Yes which one/s: PER ☐ Mining Proposal ☒ Approval id/s: MP20141224

Part D-Flagging, Delineation and Survey (TGM Survey to complete and return to Sustainability Dept with plan and DXF of points set out in field via TGMSustainabilitydata@anglogoldashanti.com.au)

Has the disturbance boundary been clearly delineated in the field?	YES ☒ NO ☐ Date: **Minestar is used**	Name: Signature:
	Disturbance delineation activities that have been undertaken are: Flagging ☐ Pegging ☐ Other *(please specify)* ☐_____ Minestar ☒ Area surrounded by existing disturbance ☐	

Part E –Assessment and Approval (Sustainability Dept to complete and return to Applicant)

Area Inspection	Area Inspection Completed: YES ☒ NO ☐, Date inspected: 02/06/2017
	Clearing boundary in place YES ☐ NO ☒
	Significant Environmental Values avoided YES ☒ NO ☐
	Pre clearing photo's taken YES ☐ NO ☒
Clearing Permit Reference	Enter clearing permit into GIS Clearing Management System if approval being granted. **PERMIT REFERENCE NUMBER TGM-GDP-0177**

Approval Granted:	**Approval Not Granted:**
Date 02/06/2017	Date_____
Name Dylan Tucker	Name_____ Signature_____
Signature 	*Sustainability Manager or delegate authorised to sign*
Sustainability Manager or delegate authorised to sign	

Approval Comments or Conditions	This GDP has been approved in accordance with the following conditions: 1. This GDP authorises clearing of up to **39.24 ha** for the Havana South Pit Shell Clearing (Open Pit) on **M39/1096**. 2. Growth medium is to be recovered to **the depth of hard surface for drill floor** and stockpiled within existing GM stockpiles. 3. Section 'D' must be completed and signed by the surveyor completing the survey and a copy email sent back to the Environment team (ASAP). 4. The clearing must be surveyed on completion and provided TGM CADGIS. 5. This GDP does not provide authorisation for any additional permits that may be required (such as excavation and penetration permit).
GDP Requestor Review of Conditions	Date_____ Name_____ Signature

Appendix 9: Vegetation Monitoring Report

Tropicana Gold Mine

Vegetation Monitoring Program – 2016 Survey

Prepared for
Tropicana Joint Venture

20 January 2017

DOCUMENT TRACKING

Item	Detail
Project Name	Tropicana Gold Mine 2016 Vegetation Monitoring Program
Project Number	16PER_5043
Project Manager	Joel Collins 08 9227 1070 Suite 1 & 2, 49 Ord St, West Perth WA 6005
Prepared by	James Leonard, Sarah Dalgleish
Reviewed by	Mark Vile
Approved by	Mark Vile
Status	Final
Version Number	2
Last saved on	20 January 2017
Cover photo	Tropicana vegetation © Eco Logical Australia 2016

This report should be cited as 'Eco Logical Australia 2017. *Tropicana Gold Mine Vegetation Monitoring Program – 2016 Survey*. Prepared for Tropicana Joint Venture.'

ACKNOWLEDGEMENTS

This document has been prepared by Eco Logical Australia Pty Ltd with support from Tropicana Joint Venture

Contents

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Abbreviations

Abbreviation	Description
AGAA	AngloGold Ashanti Australia
DMSI	Digital multispectral imagery
EP Act	Environmental Protection Act 1986
EPBC	Environment Protection and Biodiversity Conservation Act 1999
IBRA	Interim Biogeographic Regionalisation of Australia
JV	Joint Venture
GVD	Great Victoria Desert
PWSB	Process Water Supply Borefield
SAVI	Soil Adjusted Vegetation Indices
TSF	Tailings storage facility
VMP	Vegetation Monitoring Program
WA	Western Australia

Executive summary

Condition 5-2 of Ministerial Statement 839 for the Tropicana Gold Mine (The Project) specifies that:

'*The proponent shall undertake monitoring of the condition and abundance of vegetation and flora at reference and potential impact sites in accordance with the 'Tropicana Gold Project Environmental Monitoring Strategy, Version 1.0, Author: B Bastow, Issue Date: 18 February 2010' or subsequent revisions approved by the EPA CEO. This monitoring is to be carried out to the requirements of the EPA CEO on advice of the DEC*'.

The Environmental Monitoring Strategy referred to by Condition 5-2 provides an overview of all environmental monitoring to be undertaken over the life of the Project, and includes information on environmental monitoring triggers. From this overarching Environmental Monitoring Strategy, a Vegetation Monitoring Strategy (VMS) was prepared to specifically detail the annual vegetation monitoring approach to meet the requirements of Condition 5-2, and outline the triggers and actions required if triggers were reached or exceeded. Eco Logical Australia was commissioned to prepare and undertake a Vegetation Monitoring Program in accordance with the approach described in the VMS. The Vegetation Monitoring Program was prepared in 2011, with a survey (Year 1) also conducted in 2011. The first monitoring survey (Year 2) was undertaken in 2012.

This document reports the results from the Vegetation Monitoring Program 2016 (Year 6). The document also evaluates results against four of the vegetation monitoring triggers, Triggers1, 2, 5 and 6 to determine whether the trigger values have been exceeded and require further investigation into the potential cause. Trigger 1 is a 25% deviation in cover or productivity within monitoring (impact) sites relative to reference sites. Monitoring Triggers 5-6 refer to the presence, distribution, abundance and density/cover of invasive flora. Data was also collected to facilitate assessment of Trigger 2 which relates to a 25% deviation of indicator species within monitoring (impact) sites relative to reference sites.

Most sites were showing no change in cover or had increasing cover (typically seen at sites experiencing post-fire regeneration), suggesting no impacts from the Project are occurring. This was further supported by the findings from the remote sensing component of the Vegetation Monitoring Program.

Some sites exceeded 25% deviation in the comparisons of overall foliar cover (%) between 2015 – 2016 and 2016 – baseline. These sites displayed a reduction in cover which appeared to be due to natural processes, including lightning initiated fire and climatic influences. There was evidence that the vegetation is still recovering from previous burns that have been experienced throughout the area.

Three individuals of the introduced species (weed) *Salvia verbenaca* (Wild Sage) were recorded at site A3-3 and one was recorded at site A3-4, along the Infrastructure Corridor, and therefore Trigger 5 was exceeded (Identification of a weed species in a site where it had not previously been recorded). This site is located in the Pinjin Pastoral Station, which is an active cattle station, and therefore the occurrence of this weed in these sites is likely to be related to pastoral activity. Trigger 6, which is: 25% increase of weed species in abundance or cover relevant to reference site, did not require investigation in this year of monitoring as this was the first year weeds have been recorded and there is therefore no baseline data to compare to.

The remote sensing analysis did not detect any changes in vegetation that were directly attributable as an impact from the Project. Changes detected were a result of approved mine infrastructure development, changes in canopy vigour, increases in groundcover along some road sections, bare ground and drainage

lines, and fluctuations in the water levels of water bodies associated with the mine. Changes as a result of recent fires were also detected.

1 Introduction

This document describes data collection and analysis for the Tropicana Gold Mine (the Project) Vegetation Monitoring Program (VMP) for 2016 (Year 6 of the VMP), and examines changes that have occurred between 2015 and 2016 and between 2016 and baseline data. The VMP uses an integrated remote sensing and field assessment approach, and is being implemented to quantitatively monitor changes and potential impacts to vegetation, if any, that may be related to the Project.

Environmental monitoring triggers, including those relating to vegetation, were established in the Tropicana Gold Project Environmental Monitoring Strategy (AngloGold Ashanti Australia [AGAA] 2010). This document also evaluates whether these vegetation monitoring triggers have been exceeded.

The first survey for the VMP was conducted in 2011 to determine the species composition, health and cover of selected vegetation communities. From 2012 to 2016, health and cover attributes were again recorded, both remotely-sensed and ground-based, to compare with previous results. Additional data was also collected in 2015 to define indicator species within each monitoring site and in 2016 the first round of data was collected to compare to this 2015 data.

1.1 Tropicana Gold Project

1.1.1 Background

The Project is an approved and operational open pit gold mining and processing operation. Mining activities commenced in July 2012, with processing commencing in the second half of 2013. The Project is located approximately 330 km east-north-east of Kalgoorlie and 200 km east of Laverton, on the western edge of the Great Victoria Desert (GVD) in Western Australia (WA)

The Project comprises three core areas:

- An Operational Area containing open pits, waste landforms, stockpiles, tailings storage facility, processing plant, village, aerodrome and other supporting infrastructure
- An infrastructure corridor (the Pinjin Infrastructure Corridor) including an access road and communications corridor linking the Operational Area to existing communications and road networks in Kalgoorlie
- Process Water Supply Borefield (PWSB) in the Minigwal Trough to provide water for the Project.

The Project is a joint venture between AGAA (70% stakeholder and manager) and Independence Group NL (30% stakeholder), collectively known as the Tropicana Joint Venture (JV).

1.1.2 Study area

The Project is located primarily within the Great Victoria Desert (GVD) region of the Interim Biogeographic Regionalisation of Australia (IBRA) classification system (Department of Environment 2013). A small section of the western part of the Pinjin Infrastructure Corridor is situated within the Murchison IBRA region.

1.1.3 Climate

The climate of the Project area can be described as arid, generally receiving less than 250 mm of rainfall occurring sporadically throughout the year (Beard 1990). At the Tropicana Gold Mine (years 2007-2016) mean minimum temperatures recorded range between 2.6 ºC in July and 18.3 ºC in January whereas mean maximum temperatures range between 19.7 ºC in June to 36.8 ºC in January (AGAA climate data 2016; **Figure 2**).

In the year preceding the 2016 survey (November 2015 to October 2016) rainfall received at Tropicana Gold Mine was above average with the area receiving a total of 328.2 mm compared to the long term average (2007-2016) of 292.2 mm for the same period (AGAA climate data 2016). Rainfall in the three months preceding the survey (July to September) was above average, with the area receiving a total of 36.8 mm of rainfall compared to the long term average of 26.7 mm for this period (AGAA climate data 2016; **Figure 2**).

By comparison, rainfall received at Laverton Aero weather station (site number 12305; years 1994-2016), which is approximately 200 kilometres west of the Project, totalled 61.6 mm in the three months preceding the survey (July to September) which was above the long term average of 34.6 mm for this area (Bureau of Meteorology [BOM] 2016; **Figure 3**).

This region experiences sporadic thunderstorms, which on occasion cause large fires that burn inside the study area.

A more detailed overview of the existing environment and regional climate and weather is provided in the 2011 report (Eco Logical Australia [ELA] 2011).

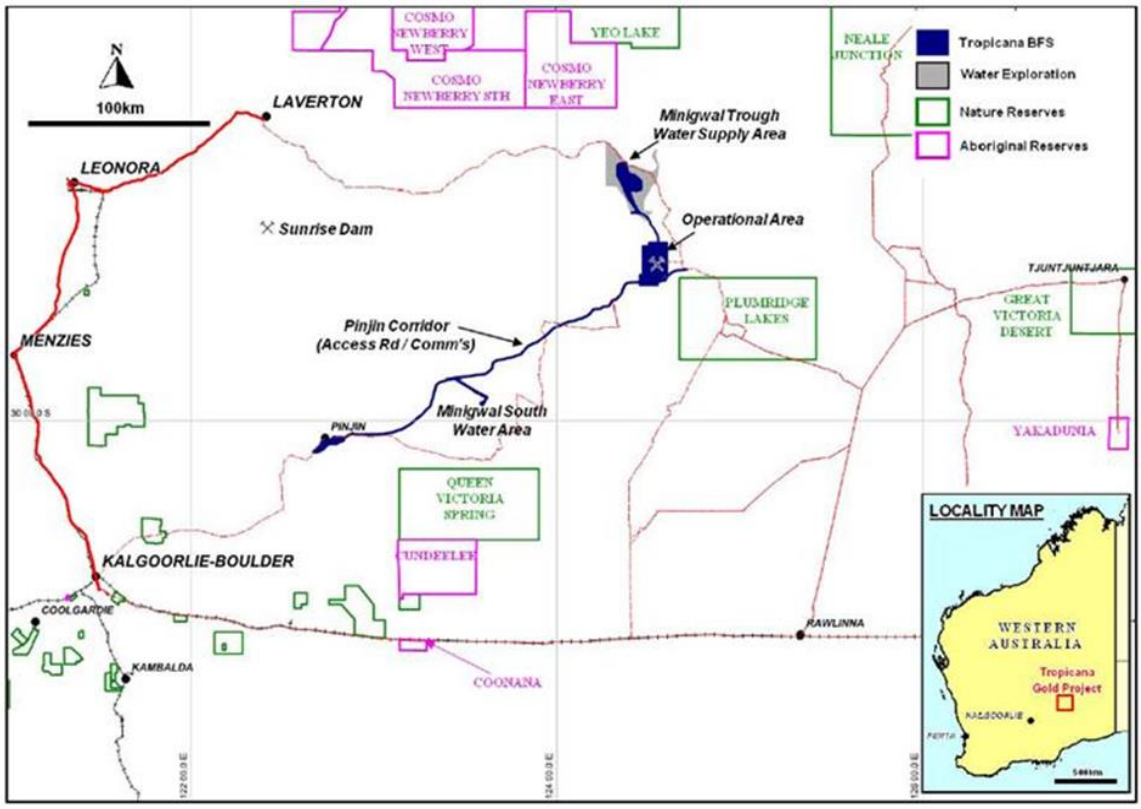


Figure 1: Location of the Tropicana Gold Project, showing locations of the Operational Area, Water Supply Borefield, and Infrastructure Corridor

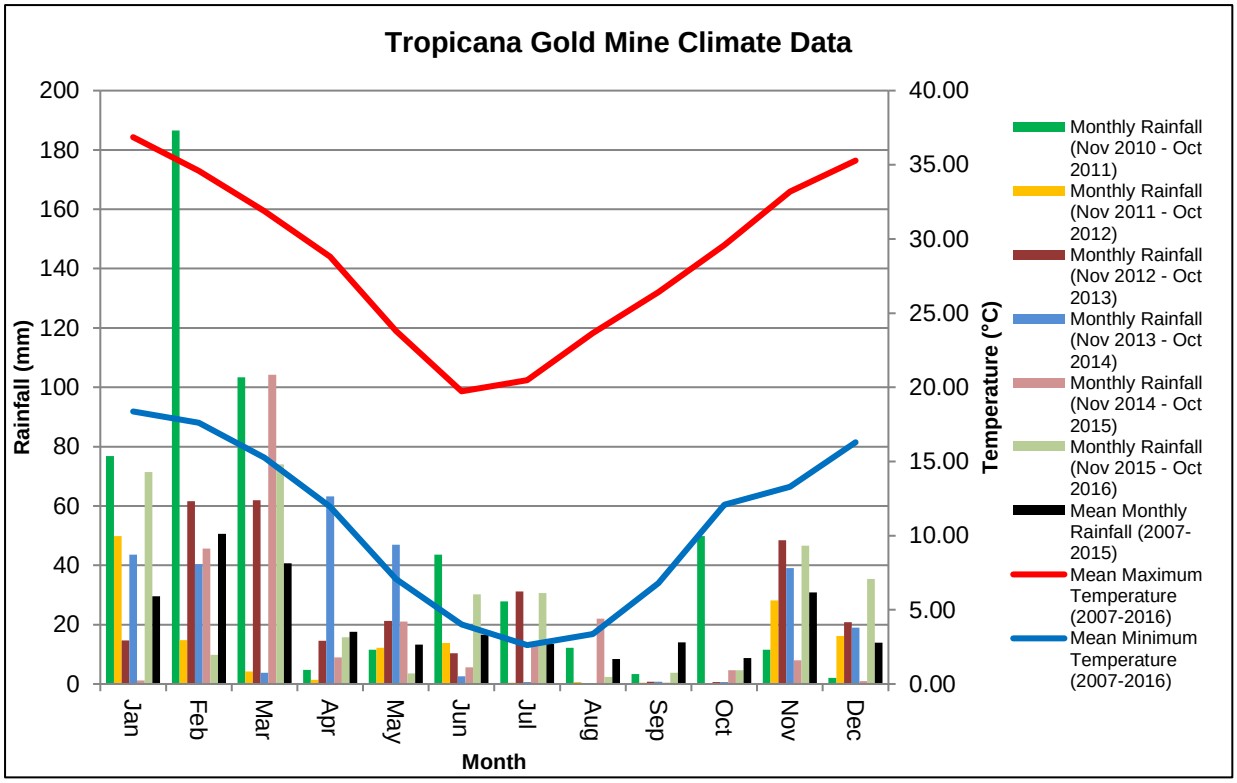


Figure 2: Long-term climate graph and rainfall for the current and previous monitoring years for Tropicana Gold Mine (AGAA data 2016)

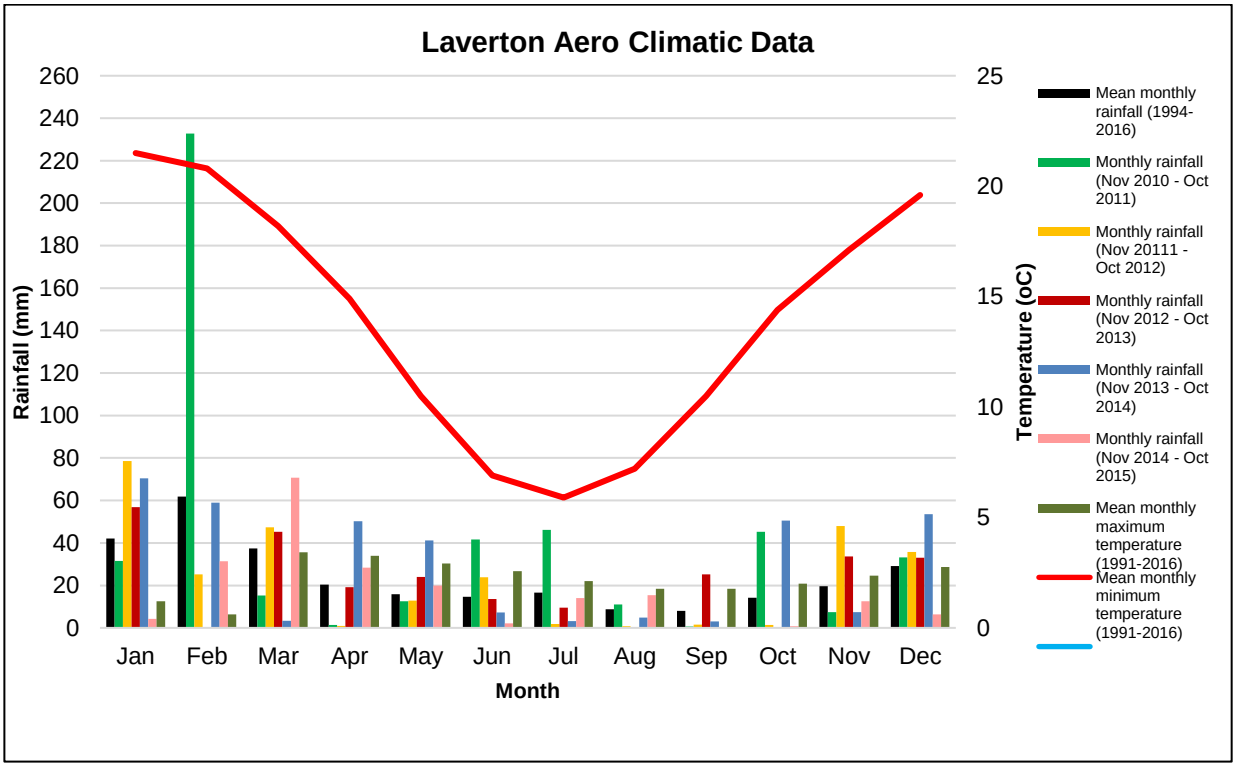


Figure 3: Long-term climate graph and rainfall for the current and previous monitoring years for Laverton Aero weather station (number 12305; BoM 2016)

1.1.4 Ministerial approval and conditions

An environmental impact assessment to meet both State and Commonwealth requirements was completed in 2009 with WA approval (Ministerial Statement 839) under the State *Environmental Protection Act 1986* (EP Act) being obtained in September 2010 and approval under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) obtained in December 2010.

Condition 5-2 of Ministerial Statement 839 for the Project specified that:

'The proponent shall undertake monitoring of the condition and abundance of vegetation and flora at reference and potential impact sites in accordance with the 'Tropicana Gold Project Environmental Monitoring Strategy, Version 1.0, Author: B Bastow, Issue Date: 18 February 2010' or subsequent revisions approved by the EPA CEO. This monitoring is to be carried out to the requirements of the EPA CEO on advice of the DEC' (Minister for Environment; Youth 2010).

The aim of this document is to meet the requirements of this condition.

1.2 Purpose of the Vegetation Monitoring Program

The VMP is being undertaken in part to assist in assessing environmental performance of the Project (acknowledging this is not the only tool being used to measure environmental performance) and to also specifically meet Condition 5-2 of Statement 839.

The Environmental Monitoring Strategy referred to by Condition 5-2 provides an overview of environmental monitoring to be undertaken over the life of the Project (AGAA 2010). The monitoring requirements, purposes, methods and frequencies from this Strategy that are applicable to vegetation are provided in the Vegetation Monitoring Strategy document (ELA and Tropicana JV 2011).

1.2.1 Potential impacts

Operational activities may lead to vegetation decline/impact in areas adjacent to the active Project areas if not appropriately managed. Potential impacts from operational activities associated with vegetation include (both direct and indirect):

- Clearing native vegetation
- Reduced sheet flow (water starving) down slope of infrastructure affecting sheet flow dependent communities
- Concentrated water flow through diversion infrastructure, with potential to cause erosion and subsequent deposition
- Runoff concentration and channel formation
- Potential for dust deposition from vehicle movements, crushing, stockpiles and cleared areas to affect fringing vegetation
- Escape of saline water to fringing vegetation due to inadequate management of activities associated with dust suppression
- Introduction and increased germination and cover of non-native (weed) species
- Compaction from off-road vehicles
- Introduction and spread of plant pathogens
- Non-adherence to clearing boundaries or delineated driving areas
- Clearing related erosion and sediment deposition
- Saline water release from infrastructure
- Drawdown of the water table

- Vehicle and other mechanical damage to vegetation
- Release of contaminated water from facilities such as the tailings storage facility (TSF) and waste landforms.

The VMP was designed using an integrated remote sensing (entire site) and targeted field assessment (local scale) approach to quantitatively determine whether there is any decline in vegetation condition that may result from any of the identified impacting processes.

1.2.2 Vegetation monitoring triggers

The Projects Vegetation Monitoring Strategy outlines the vegetation monitoring triggers for the Project. Triggers relate to native vegetation cover and productivity, indicator species, clearing boundaries, weeds, and rehabilitation, and are outlined in **Table 1**. This report addresses results obtained in relation to Triggers 1, 2, 5 and 6.

Table 1: Vegetation monitoring triggers for the Project (extract from Tropicana Gold Project Vegetation Monitoring Strategy; ELA and Tropicana JV 2011)

Parameter	Monitoring requirement	Trigger
Vegetation and flora condition	Monitoring vegetation and flora adjacent to the Project and road corridor to identify indirect impacts e.g. dust (includes internal and Mine Access Road)	1. 25% deviation in cover or productivity within monitoring (impact) sites relative to reference sites 2. 25% deviation of indicator species within monitoring (impact) sites relative to reference sites
Vegetation and flora condition	Monitor Project footprint boundaries	3. Clearing beyond boundary and/or clearing in the absence of marked boundary 4. Actual clearing beyond expected extent (GIS)
Presence, distribution, abundance and density/cover of invasive flora	Assessment of weeds present including: species, their distribution, abundance and density/cover of weeds	5. Identification of a weed species in a site where it had not previously been recorded 6. 25% increase of weed species in abundance or cover relevant to reference site
Presence, distribution, abundance and density/cover of invasive flora	Monitor weed presence within the project area and on roadsides	7. Identification of a weed species in a site where it had not previously been recorded
Rehabilitation	Monitor vegetation establishment in rehabilitated areas Following rehabilitation, areas will be monitored and treated for invasive flora invasion, if necessary	8. N/A 9. Weed identified in rehabilitation

2 Methods

2.1 Remote sensing data and analysis

2.1.1 Data capture and assessment

High resolution digital multispectral imagery (DMSI), with four bands (Blue, Green, Red and Near Infrared) was captured by Outline Imagery from the 17 – 19 October and on the 22 October, 29 October and 18 November 2016. Images were resampled to a pixel resolution of 1 m. The 2016 imagery was compared to similar imagery captured between 30 September to 20 October 2015. The footprint of data capture is outlined in **Figure 4**. **Appendix A** provides the DMSI visual assessment outputs.

Each image was assessed for quality using visualisation of each image band, band ratios and band histograms. Image quality in terms of cloud effects, dust effects or incorrect offset and gains were assessed and recorded.

2.1.2 Data processing

All images were processed to create Soil Adjusted Vegetation Indices (SAVI) images (Equation 1).

Equation 1: $SAVI = ((NIR-Red)/(NIR+Red+L))*(1+L)$

NIR = Near Infrared Band, R = Red Band, L = the soil cover adjustment factor (set to 0.8 in all cases). The value of 0.8 was used due to the large amount of bare soil within the images. By using this value the aim was to reduce the effect that the soils has on the analysis.

The corresponding SAVI images for each mosaic section were processed to create change detection images between the time periods. The images were analysed to detect year to year change by subtracting each Previous (2015) image from each Current (2016) (Equation 2).

Equation 2: $\Delta SAVI = Current(SAVI) – Previous(SAVI)$

Each of the change detection images were divided into a colour spectrum using a piecewise contrast stretch to help define the areas of change (Redder colours = loss, Bluer colours = gain and Light Green = little or no change).

All image processing and assessment was carried out using ENVI 5.0 image processing software.

2.1.3 Data assessment

A set of standard tiles was created over the entire project footprint at a scale of approximately 1:20,000 (ELA 2011). Each tile was designed to be 6,000 m by 3,200 m with approximately 100 m of overlap between adjoining tiles to facilitate on-screen assessment and ensure coverage of the entire area. A total of 86 tiles were created. Each tile was given a unique label to facilitate rapid identification and future comparison. This network of tiles forms the basis for detailed systematic evaluation of change in vegetation communities for ongoing monitoring. Additional tiles will be developed to facilitate analysis within the expanded image capture area.

Each change image was displayed on the screen at high resolution using the tile layout. The image zoomed in to a viewing scale of 1:5,000 or higher. In addition to the change image the true colour images for 2015 and 2016 were compared and assessed to identify areas of ‘significant change’ in vegetation.

Areas of ‘significant change’ in vegetation cover were documented using a GIS polygon and a table recording system. A minimum mapping unit of 40 m x 40 m (1600 m2) was used.

To determine a ‘significant change’ each change image was inspected on-screen using the tile layout. A contrast stretch was applied to the image to highlight areas of potentially significant change, being areas where the change in the SAVI index differed by more than 1 standard deviation from the average change between years. This enabled differentiation between possible mine impacts and broad seasonal variability between years.

All derived images and polygons were stored as jpg files and shapefiles using the tile labelling file system to enable ease of display and further analysis.

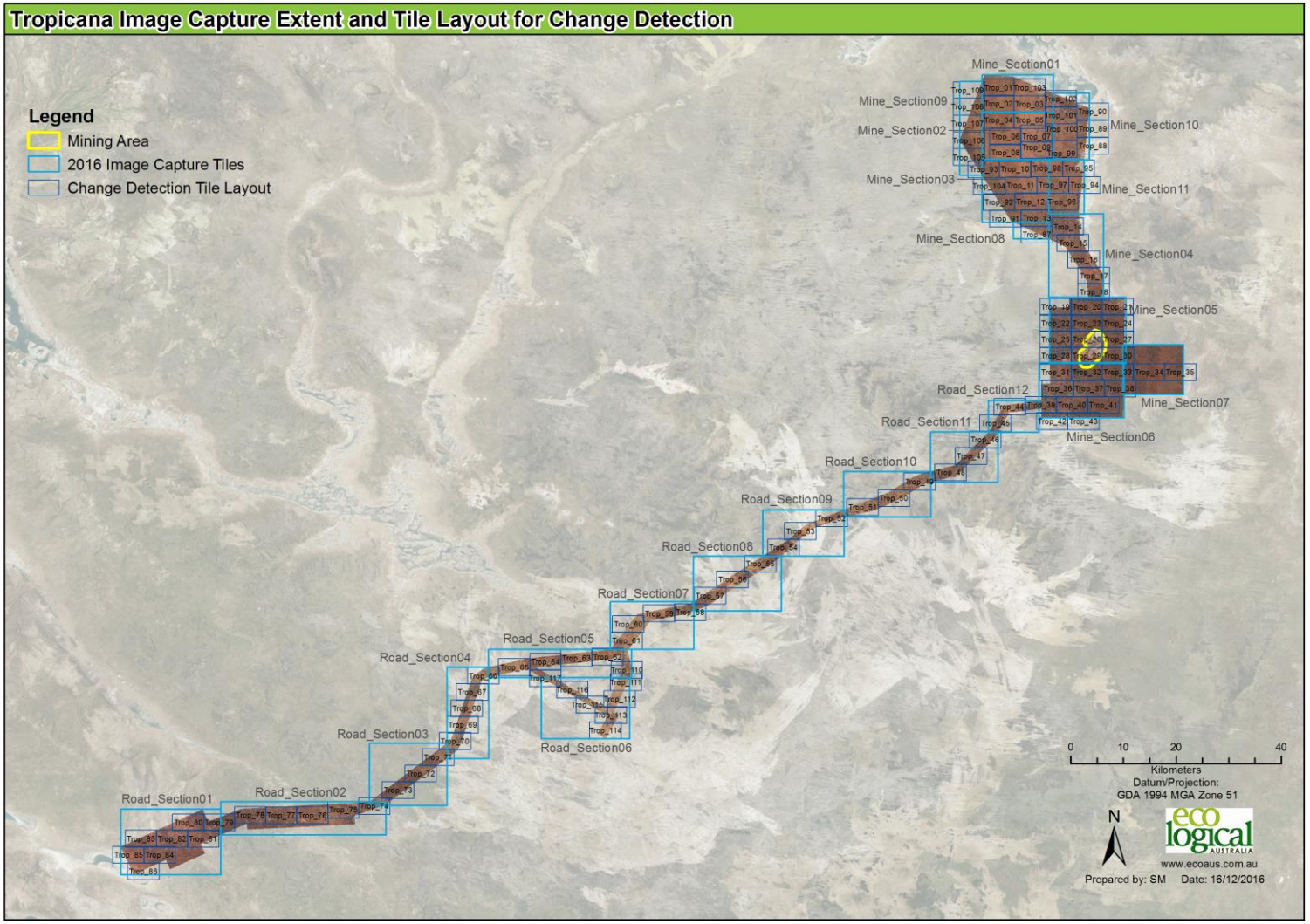


Figure 4: Image capture extent and tile layout for change detection

2.2 Floristic survey and vegetation condition assessment

The 2016 survey was undertaken from 13 to 17 October 2016 by Joel Collins and Sarah Dalgleish of ELA and by AGAA employees (acting as field assistants).

2.2.1 Survey design

A total of 112 quadrats located within 14 representative vegetation communities consisting of 55 reference and 57 impact sites were surveyed during the 2015 survey. This included the 106 quadrats (20 × 20 m) originally established in 2011 (consisting of 53 reference and 53 impact sites) along with two new impact sites established in 2012 and two new impact and reference sites established in 2014.

For the purposes of this report the sites have been grouped into the three core areas (Operational Area, Infrastructure Corridor and PWSB) listed by vegetation community. Each reference and impact sites have then been paired together. The vegetation communities selected for monitoring and their representative sites (grouped in pairs) are listed in **Table 2**. The locations of the quadrats in each core area are shown in **Figure 5**. Quadrat names, location coordinates and attributes are presented in **Appendix B**. More detailed maps of the quadrat locations in each core area are provided in **Appendix C**.

Table 2: Vegetation communities included in the Project Vegetation Monitoring Program and associated sites

Vegetation code (from ELA 2011)	Description of floristics	Sites		Number of sites
		Impact	Reference	
Operational Area				
A7a	*Acacia aneura* woodlands over grasses+/- *Triodia basedowii*	A7a-5	A7a-6	10
		A7a-10	A7a-9	
		A7a-8	A7a-7	
		A7a-1	A7a-4	
		A7a-2	A7a-3	
A7b	Open to moderately dense *Acacia aneura* over *Aluta maisonneuvei* subsp. *auriculata*/ *Acacia ramulosa* var. *ramulosa* over *Eremophila forrestii* subsp. *forrestii* over *Triodia basedowii*	A7b-2	A7b-1	4
		A7b-4	A7b-3	
C9	Open to moderately dense *Casuarina pauper* woodland over open mixed shrubs and scattered soft grasses and/or *Triodia scariosa*	C9-1	C9-3	4
		C9-2	C9-4	
E1b	Open *Eucalyptus youngiana* and sparse *Callitris preissii* over mixed shrubs over open to moderately dense *Triodia basedowii*	E1b-1	E1b-2	10
		E1b-8	E1b-7	
		E1b-3	E1b-4	
		E1b-5	E1b-6	
		E1b-10	E1b-9	

Vegetation code (from ELA 2011)	Description of floristics	Sites		Number of sites
		Impact	Reference	
E3	Occasional *Eucalyptus gongylocarpa* over mixed upper stratum over *Daviesia grahamii*/*Pityrodia loricata*/*Chrysocephalum puteale* low shrubland over sparse to open *Triodia desertorum* or *T. basedowii and Lomandra leucocephala* subsp. *robusta*	E3-1	E3-2	6
		E3-3	E3-4	
		E3-5	E3-6	
Subtotal		17	17	34
Pinjin Infrastructure Corridor				
A2	Low Woodland to Tall Shrubland of *Acacia ayersiana* and *Acacia aneura* var. *aneura* with *Acacia aneura* var. *argentea* over *Eremophila* spp., *Aluta maisonneuvei* subsp. *auriculata* and *Prostanthera* spp. This community occurs on orange sandy loam	A2-6	A2-5	12
		A2-1	A2-7	
		A2-9	A2-8	
		A2-2	A2-10	
		A2-3	A2-11	
		A2-4	A2-12	
A3	Low Open Woodland to Tall Open Shrubland of *Acacia ayersiana* and *Acacia aneura* var. *aneura* over *Acacia* spp. and mixed shrubs. This community occurs on orange sandy loams	A3-2	A3-1	6
		A3-4	A3-3	
		A3-5	A3-6	
A7b	Open to moderately dense *Acacia aneura* over *Aluta maisonneuvei* subsp. *auriculata*/ *Acacia ramulosa* var. *ramulosa* over *Eremophila forrestii* subsp. *forrestii* over *Triodia basedowii*	A7b-6	A7b-5	4 + 1 new in 2012
		A7b-7	A7b-8	
		A7b-9^		
E4	Low Woodland to Low Open Woodland of *Eucalyptus gongylocarpa* with *Callitris preissii* and *Eucalyptus* spp. over mixed shrubs over *Triodia* spp. This community occurs on orange, red-orange, yellow-orange and yellow sandy loams on mixed topographies	E4-3	E4-4	14
		E4-5	E4-6	
		E4-2	E4-1	
		E4-7	E4-8	
		E4-9	E4-10	
		E4-11	E4-12	
		E4-14	E4-13	
E9	Low Open Woodland of *Eucalyptus concinna* with *Eucalyptus* spp. over *Eremophila scoparia*, *Acacia hemiteles*, *Acacia colletioides*, *Scaevola spinescens* and *Eremophila caperata* over *Triodia scariosa*. This community occurs on orange sandy loams on flats	E9-2	E9-1	4
		E9-6	E9-5	
S8		S8-2	S8-6	

Vegetation code (from ELA 2011)	Description of floristics	Sites		Number of sites
		Impact	Reference	
	Low Shrubland of *Acacia desertorum* var. *desertorum* with *Grevillea juncifolia*, low Myrtaceous shrubs and mixed low shrubs with occasional emergent *Eucalyptus youngiana* and *Eucalyptus* spp. This community occurs on pale orange sandy loams on flats	S8-3	S8-1	6 + 1 new in 2012
		S8-4	S8-5	
		S8-7^		
Subtotal		23 + 2 new in 2012	23	46 + 2 new in 2012
Water Supply Borefield				
E2	*Eucalyptus gongylocarpa* over mixed *Acacia* over mixed moderately open to moderately dense shrubs over *Triodia basedowii*	E2-5	E2-6	6
		E2-1	E2-4	
		E2-2	E2-3	
T1	Open to moderately open mixed shrubs over *Triodia basedowii*	T1-3	T1-1	4
		T1-4	T1-2	
X1	Mixed Eucalypt woodlands dominated by *Eucalyptus gongylocarpa*/ *E. youngiana* over mixed open shrubs and *Triodia basedowii*	X1-1	X1-2	16
		X1-15	X1-16	
		X1-11	X1-12	
		X1-13	X1-14	
		X1-9	X1-10	
		X1-7	X1-8	
		X1-4	X1-6	
		X1-3	X1-5	
M1	Moderately dense to dense *Acacia aneura* woodland over isolated shrubs over scattered *Triodia basedowii*.	M1-3*	M1-4*	4 new in 2014
		M1-1*	M1-2*	
Subtotal		13 + 2 new in 2014	13 + 2 new in 2014	26 + 4 new in 2014
TOTAL		53 + 2 new in 2012 + 2 new in 2014	53 + 2 new in 2014	106 + 2 new in 2012 + 4 new in 2014*

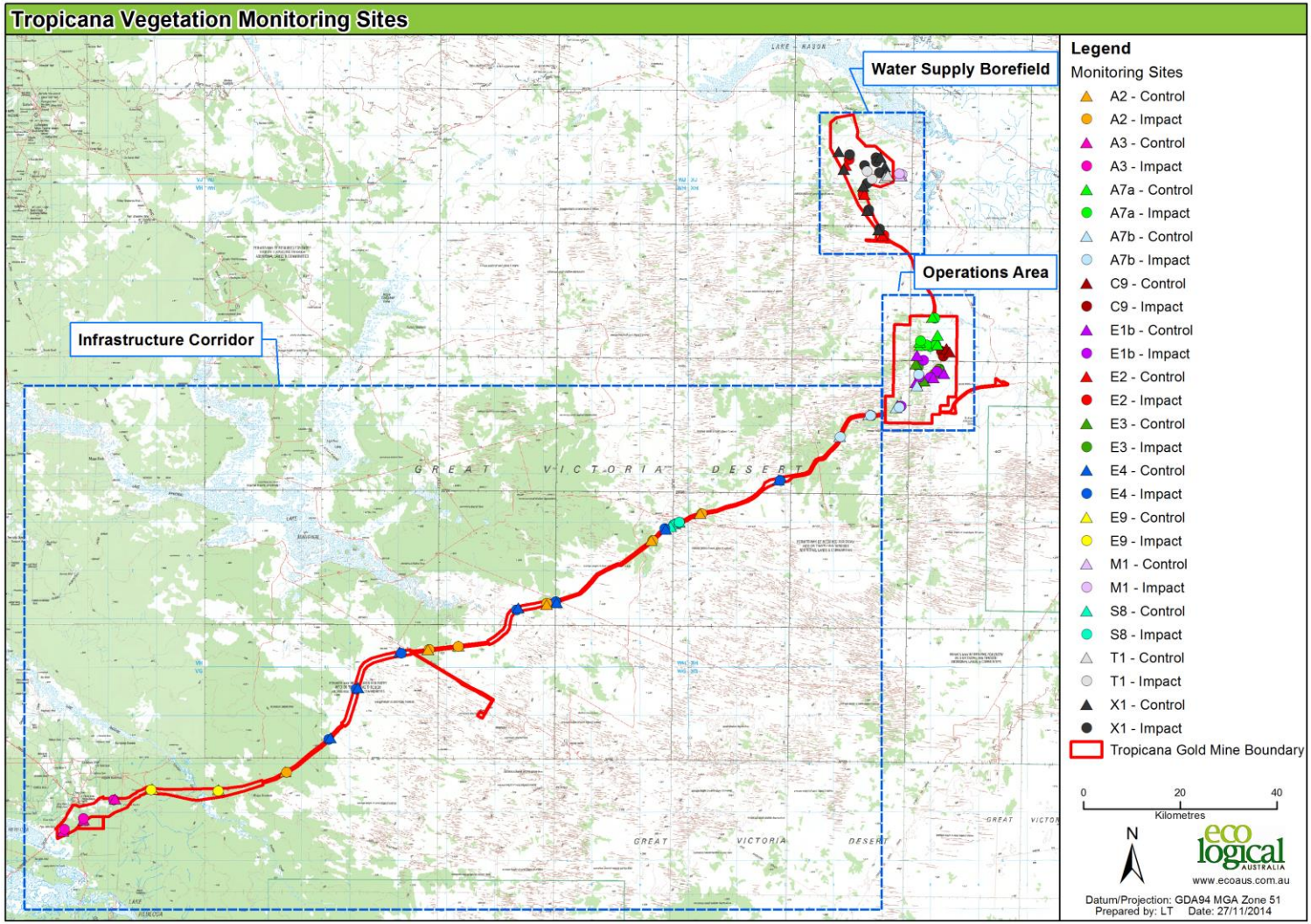


Figure 5: Field quadrat locations

2.2.2 Survey data collection

Vegetation condition

The following attributes were collected in each of the 112 sites (106 original quadrats from 2011, two additional quadrats established in 2012, and four additional quadrats established in 2014):

- Overall % foliar cover (estimate)
- % foliar cover based on vegetation strata (e.g. overstorey, midstorey, understorey)
- % bare soil
- Foliar condition for the quadrat, measured using two qualitative scales:
    - Browning scale of Green (healthy), Yellow (senescent), or Brown (dead or dying foliage)
    - Leaf loss scale (1 through to 5 with 1 indicating denuded branches and 5 indicating a full canopy of leaves)
- Disturbance (location and dimensions of tracks etc, marked on a map of the quadrat)
- Depth of erosion rills or gullies, or depth and dimensions of sediment deposition
- Other observations (e.g. recent fire occurrence, storm damage, weeds, pest or pathogen attack).

Indicator species

The number of individuals were counted for each indicator species selected for each site in the 2015 Vegetation Monitoring Program.

Photographic data

Photographic monitoring of each of the quadrats involved the following steps:

- A panoramic photograph was taken with the camera held at chest height directly above the northwest corner peg. A photo board, consisting of a sheet of paper on a clipboard with the site name and date written on it was placed approximately 5 m in front of the northwest corner peg to be visible in the photograph. A measuring pole was erected at the centre peg to a height of at least 2 m. Photographs were taken with two digital cameras (Sony DSC-HX50V) set on panorama. Note that for the 2011 and 2012 photographs, a canon PowerShot SX30 IS digital camera with a focal length of 4.3 mm was used.
- The panoramic photos started due east, and swept east to south, ending due south. As follows:
    - Due east along the quadrat boundary;
    - southeast (towards the centre peg); and
    - due south along the quadrat boundary.

2.2.3 Assessment of vegetation condition attributes

For the purposes of conducting an assessment of potential change in vegetation condition the sites have been grouped into the three core areas (Operational Area, Infrastructure Corridor and Water Supply Borefield) listed by vegetation community. Each of the reference and impact sites have then been paired together to allow for comparisons to be made.

Vegetation condition data was assessed to determine if any changes have occurred between 2015 and 2016 and to assess if any patterns are emerging of a decreasing trend in vegetation condition. To determine if any changes have occurred between 2016 and the baseline data an assessment was undertaken against vegetation monitoring Trigger 1 (see section 2.3).

The assessment focussed on the following vegetation condition attributes:

- Comparisons of the percentage covers (overall) of each paired site, listed by each vegetation community in the three core areas
- Comparisons of measures of foliar condition
- Other observations, including erosion and weeds.

2.3 Evaluation of data against vegetation monitoring triggers

Assessments of data were undertaken against vegetation monitoring Trigger 1 (25% deviation in cover or productivity within monitoring (impact) sites relative to reference sites), as outlined in the Environmental Monitoring Strategy (AGAA 2010) and reproduced in the Vegetation Monitoring Strategy (ELA and Tropicana JV 2011) (**Table 1**). The survey in 2016 was the first year that assessments of data were undertaken against vegetation monitoring Trigger 2 (25% deviation of indicator species within monitoring (impact) sites relative to reference sites). Other assessments against monitoring Triggers 5-6 were also undertaken. Monitoring Triggers 5-6 refer to the presence, distribution, abundance and density/cover of invasive flora. Trigger 5 is defined as "Identification of a weed species in a site where it had not previously been recorded" and Trigger 6 is defined as "25% increase of weed species in abundance or cover relevant to reference site". Other assessments against Triggers 3-4 relating to clearing boundaries, Trigger 7 relating to monitoring weeds and Trigger 8-9 relating to weeds in rehabilitation areas were not undertaken as these do not directly relate to data collected as part of the VMP.

Assessments for Trigger 1 were conducted through comparisons of overall foliar cover.

In order to clearly show whether a deviation in cover greater than 25% has occurred the results have been colour-coded by 'flags' with green indicating impact sites within 25% investigation threshold, blue indicating impact sites that have an increase in cover which exceeds the 25% threshold and red indicating impact sites that have a decrease in cover which exceeds the 25% threshold, as shown in **Table 3** below.

Table 3: Colour-coded flags indicating deviation in cover for impact sites

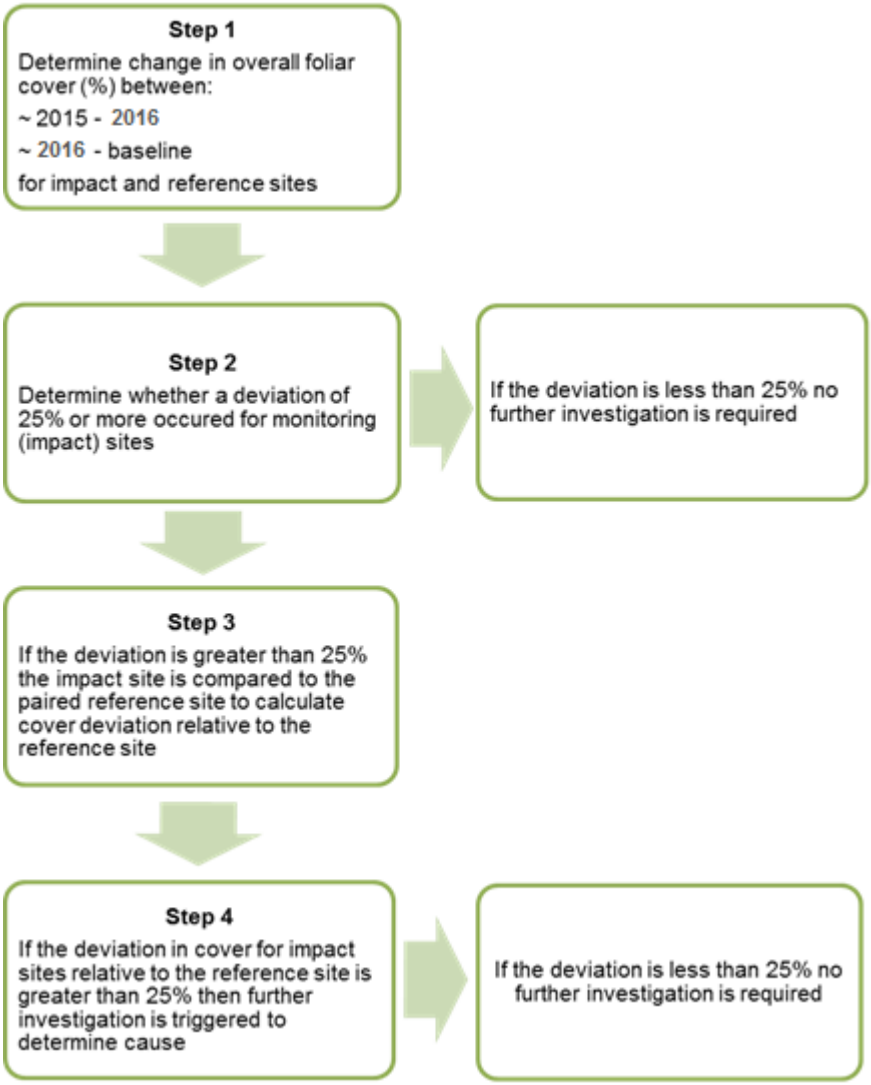
Flag	Definition
Green	Impact site/s within 25% threshold, no further investigation required
Blue	Impact site/s with an increase in cover which is at or exceeding the 25% threshold, further investigation required relative to the paired reference site
Red	Impact site/s with a decrease in cover which is at or exceeding the 25% threshold, further investigation required relative to the paired reference site

Comparisons of overall foliar cover were made between 2015 to 2016 data and the 2016 data was compared against the baseline. For analysis of previous data, the baseline was considered to be data collected in 2011 when the Project was initially established in Year 1. For the 2015 survey, a baseline dataset comprising the mean overall foliar cover (%) for years 2011, 2012 and 2013 was used in the

analysis. This was considered more appropriate as it captures the year to year variability of the study area as a result of climatic influences, which provides a more robust baseline given the five year duration of monitoring to date. This baseline was also used for the 2016 comparison.

Further assessments were then undertaken to determine whether a deviation in cover of 25% occurred for monitoring (impact) sites. If a deviation occurred that was greater than 25%, the impact site was then compared to the paired reference sites to calculate the change in cover for the impact site relative to the reference site. If impact sites showed a decreasing deviation in cover greater than 25% relative to the reference site further investigation was triggered. If impact sites showed an increasing deviation in cover greater than 25% relative to the reference site no further investigation was deemed to be required as this represents a positive trend in vegetation condition. This process is outlined in the flow diagram presented in **Table 4**.

Table 4: Flow diagram showing steps to investigate deviation in cover for Trigger 1



3 Results

3.1 Remote sensing

Comparison and assessment of SAVI imagery from 2016 and 2015 for changes showed some areas of change relating clearly to mine infrastructure development (e.g. roads, borrow pits, airstrip, operational areas etc.) or fire. However, no areas of unapproved impacts from the Project were identified.

Generalised patterns of changes found in the imagery were due to:

- Image to image mis-registration (image registration was with a 3 m allowable error, resulting in some areas of expected pixel misalignment)
- Changes in shadow due to variation in sun angle due to time of image capture in the day and changes in season
- Changes in canopy vigour, particularly in areas with higher levels of foliar cover. Canopy extent changed little throughout the image area; however minor increases in SAVI potentially reflected variation in vegetative vigour. This varied both within and between tiles with a general trend of lower plant canopy vigour potentially occurring near the northern limits of the capture area
- Fluctuations in groundcover along some road sections, areas of bare ground and drainage lines
- Fluctuations in the water level of water bodies between years, showing either a dense area of increase (drying), or decrease (wetting).

The remote sensing analysis detected large areas of vegetation change, which are likely to be the result of lightning initiated fire in the vicinity of Mine Section 4 and Mine Sections 2 and 10 (**Figure 6** and **Figure 7**). Analysis also detected an increase in vegetation in Road Sections 11 and 12 likely due to recovery from previous vegetation change related to fire (**Figure 8**).

Tile by tile comparison is included in **Appendix D**. Maps of all tiles (colour 2015, colour 2016 and change 2015-2016) are supplied in the attached data disc. The location of each tile is shown in **Figure 4.**

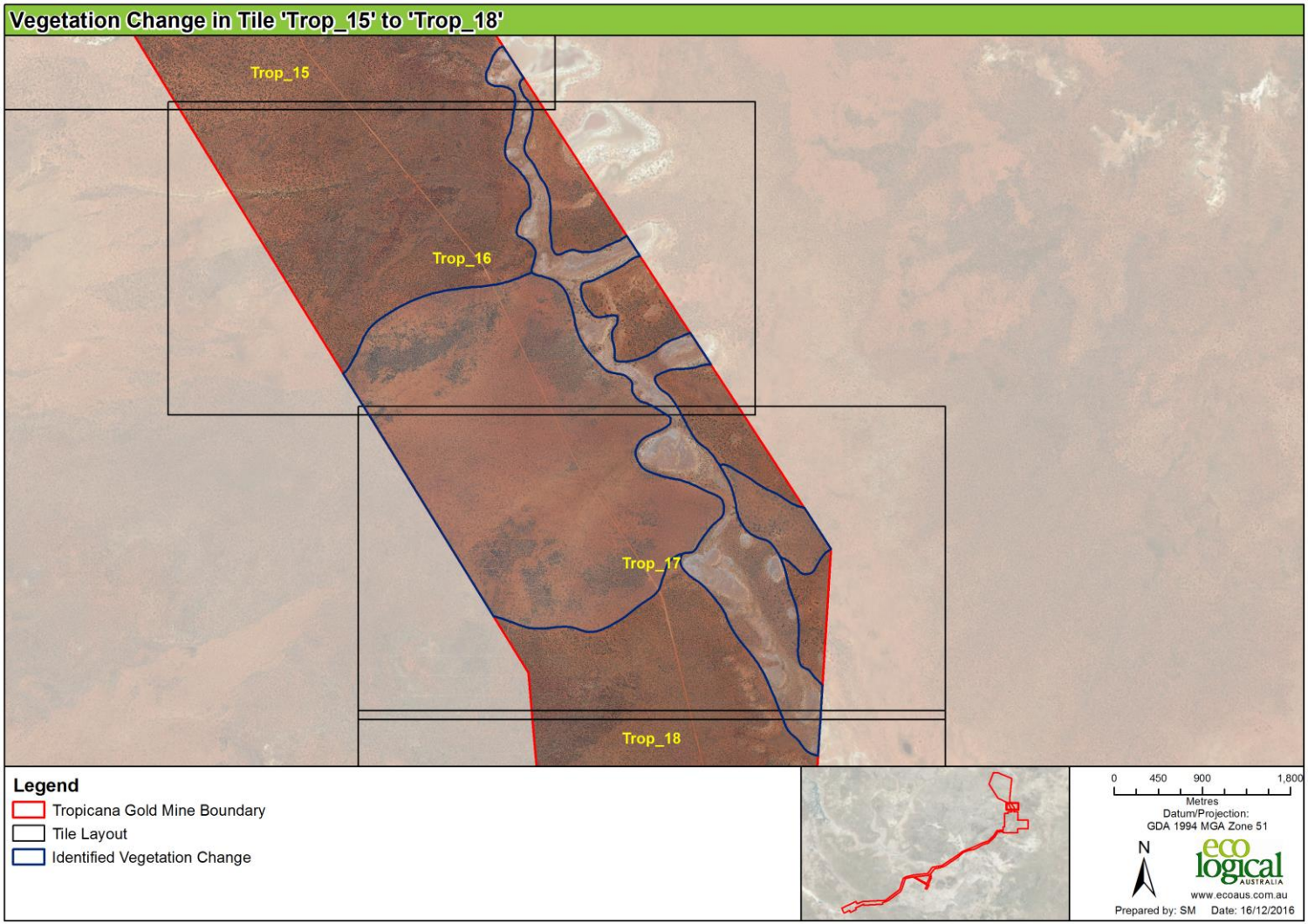


Figure 6: Vegetation change near Mine Section 4 showing where a fire has passed through

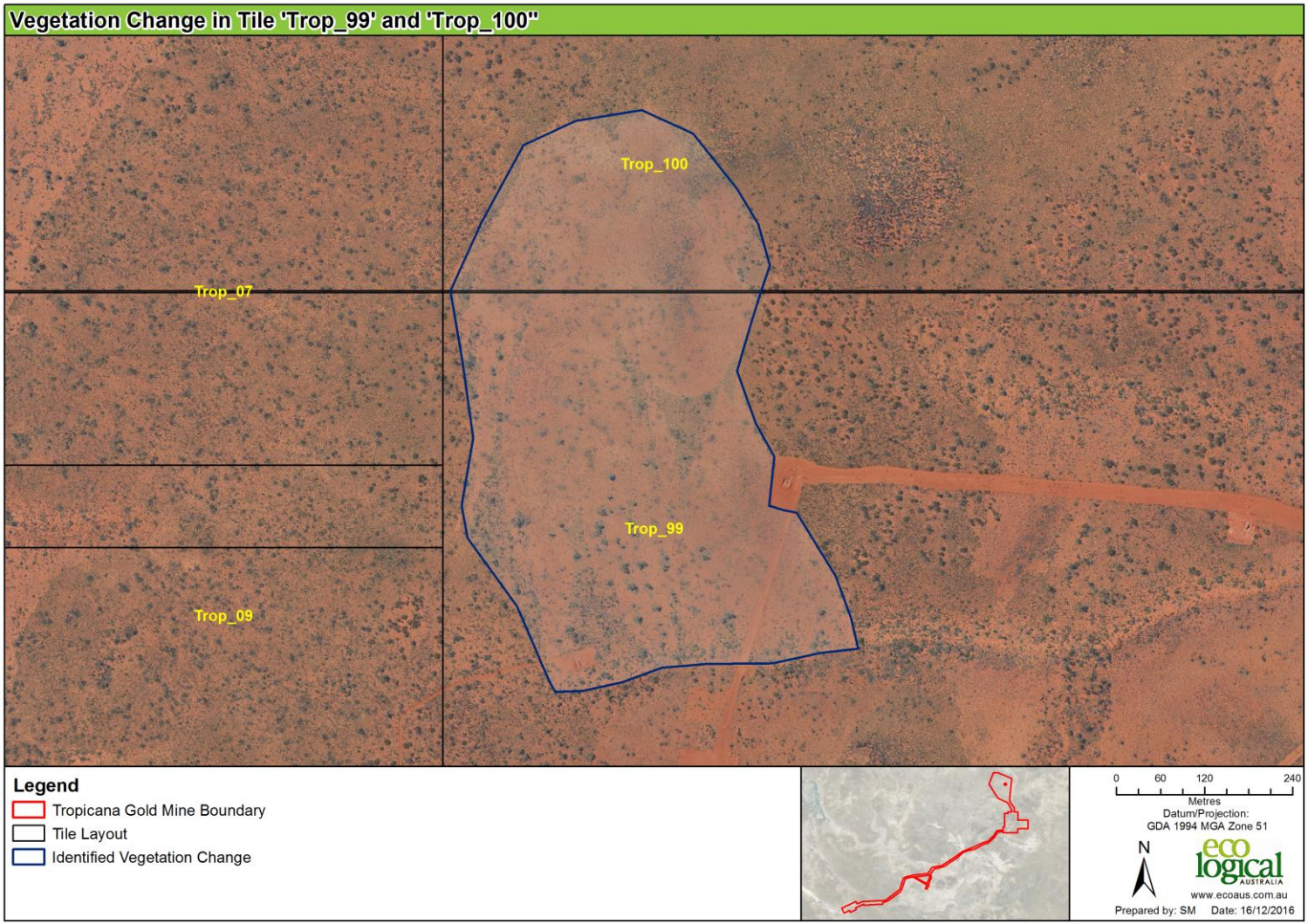


Figure 7: Vegetation change near Mine Section 2 showing changes due to fire

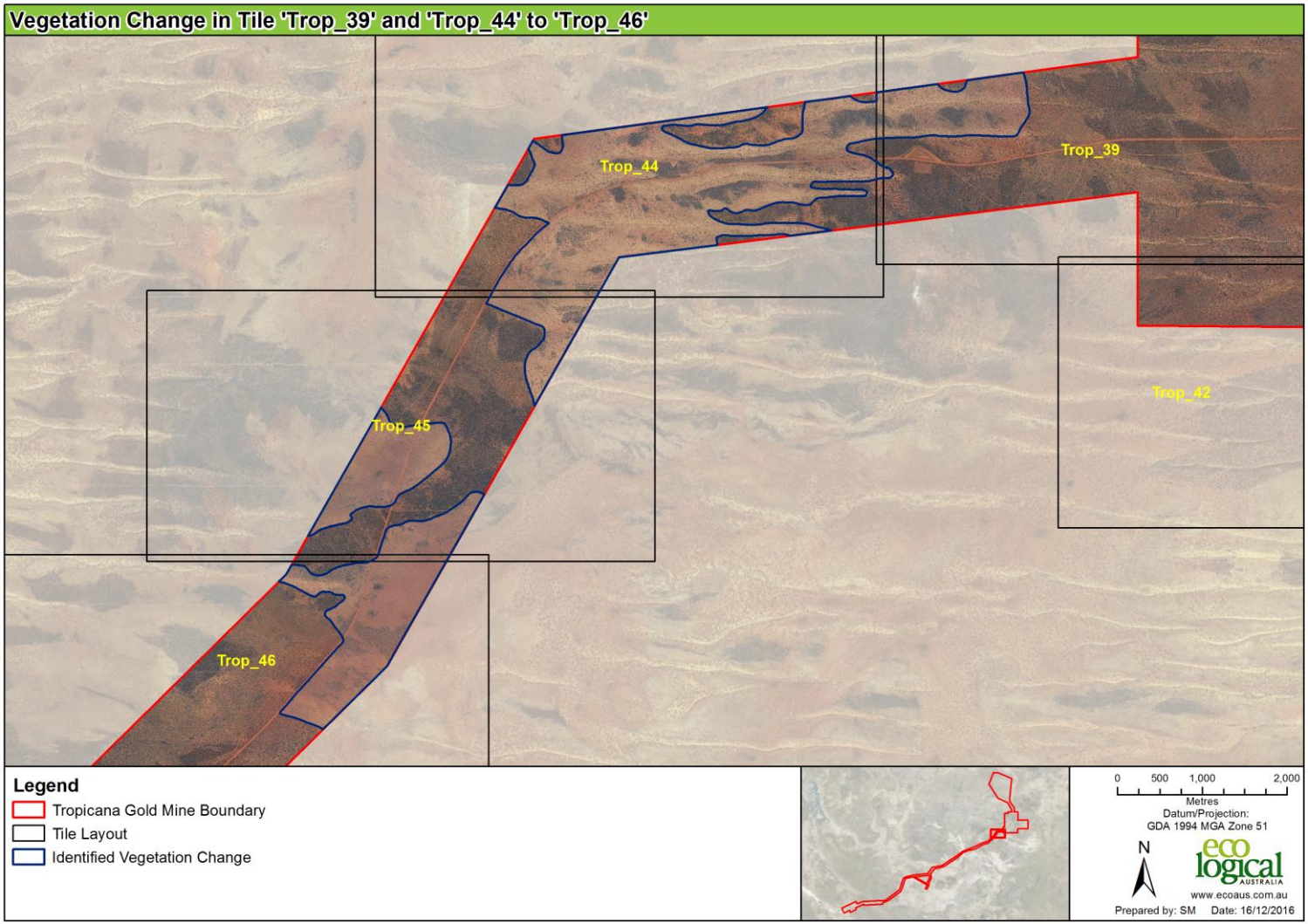


Figure 8: Vegetation change near Road Sections 11 and 12 showing changes due to post fire vegetation recovery

3.2 Floristic survey and vegetation condition assessment

The results of the vegetation condition assessment are provided for the three core areas (Operational Area, Infrastructure Corridor and Water Supply Borefield) listed by vegetation community. The raw data sheets completed during the 2016 survey are provided in **Appendix E**.

3.2.1 Operations Area

Foliar cover, condition and other attributes

The foliar cover (%) data for the 2016 survey generally remained consistent with the 2015 data for each of the quadrats in the Operations Area with minimal or no changes recorded. Ten sites (A7a-5, A7a-1, A7a-3, C9-1, C9-2, C9-3, A7b-1, A7b-3, E1b-9 and E1b-10) recorded an increase in overall foliar cover, from 2015 to 2016, between 5% and 15%.

There was an increase in the overstorey coverage for eight sites (A7a-1, E3-2, E3-3, E1b-2, E1b-9, E1b-10 and C9-1) between 1% and 30%, while two sites (A7a-4 and C9-2) had a slight reduction in overstorey coverage of 5%. The reduction at site A7a-1 was due to a fallen branch (which was weakened in a previous fire) and at C9-2 was due to natural senescence of older foliage. The midstorey coverage increased at seven sites of no more than 5% (A7a-8, A7a-9, E1b-3, E1b-5, A7b-1, C9-1 and C9-3). One site (A7a-3) had a minor reduction of 1%. The understorey coverage increased at five sites (A7a-1, A7a-5, E1b-9, A7b-3 and C9-3) ranging between 1 to 25%. There was a very slight reduction in understorey cover at two sites (A7a-10 and C9-1) ranging between 0.25% and 1%.

Comparison between the impact sites and their paired reference sites indicated a similar trend was occurring for both sites. It was noted during the survey that slight changes in cover at these sites was a result of natural processes including termite activity and senescence of older vegetation, and not as a result of the Project activities. The raw data for foliar cover between 2011 and 2016 is presented in **Appendix F**.

The raw data for foliar condition (browning scale and leaf loss scale) indicated that the foliar condition for the overstorey and midstorey was mostly recorded as green (healthy) for 2016 survey. The understorey was mostly recorded as green (healthy) to yellow (senescent). No sites were recorded as brown (dead or dying) within the 2016 survey. The leaf loss scale recorded in 2016 for the over, mid and understorey were either 4 or 5, with 5 indicating a full canopy of leaves. Occasionally 3 was recorded in the understorey but this was not considered significant as it represents, the typical variation in response to climatic influences (e.g. annual species die off, *Triodia* spp. dying back in drier times). The raw data for foliar condition (browning scale and leaf loss scale) is present in **Appendix G**.

No signs of erosion or deposition were recorded in any quadrats during the 2016 survey. It was noted in quadrat C9-1 that a vehicle had driven through this quadrat and damaged a couple of plants.

Evaluation of data against vegetation monitoring triggers

Comparisons of overall foliar cover (%) were made for the impact sites between 2016 to 2015 data and the 2016 data was compared against the baseline (comprising mean overall foliar cover for 2011, 2012 and 2013). **Table 5** presents the overall foliar cover deviation values for the two comparisons with the colour-coded flags (as described in Section 2.3). It also shows the difference between impact sites relative to the reference site.

Six sites (A7a-1, A7a-5, A7a-8, A7a-10, C9-2 and E1b-10), in 2016, had increase in overall foliar cover by more than 25% in comparison to the baseline. One site (A7a-2) had a decrease in overall foliar cover by more than 25% in comparison to the baseline. The reference site for A7a-2 (A7a-3) also experienced a decrease in foliar cover of 17% in comparison to the baseline. As noted in previous years, this variation is likely due to termite activity and natural senescence of *Triodia* and not due to the Project activities. This is supported by review of the 2016 site photo which shows no evidence of mining related disturbances. Furthermore, when the deviation of A7a-2 is compared to the deviation for A7a-3, the deviation was no more than 25%, for comparisons between both 2016 – baseline and 2016 – 2015. There was therefore no requirement to undertake further investigation under Trigger 1.

No sites, in 2016, had an increase or decrease in overall foliar cover by more than 25% in comparison to the 2015 survey.

No weed species were recorded in any quadrats during the 2016 survey in the Operations Area, which is consistent with the previous surveys between 2011 and 2015. As no weed species were recorded in any quadrats during the 2016 survey in the Operations Area Trigger 5 and Trigger 6 do not require further investigation.

Table 5: Overall foliar cover deviation (%) for impact sites in the Operations Area

Site	Site type	% deviation of 2016 relative to baseline^	Difference between % deviation of impact relative to reference quadrats for 2016 – baseline^	% deviation of 2016 sites relative to 2015 sites	Difference between % deviation of impact relative to reference quadrats for 2016 - 2015
A7a-5	Impact	26	-24	23	n/a
A7a-6	Reference	50		0	
A7a-10	Impact	41	5	0	n/a
A7a-9	Reference	36		0	
A7a-8	Impact	29	67	0	n/a
A7a-7	Reference	-38		0	
A7a-1	Impact	38	28	20	n/a
A7a-4	Reference	10		0	
A7a-2	Impact	-38	-21	0	n/a
A7a-3	Reference	-17		25	
C9-1	Impact	5	n/a	17	n/a
C9-3	Reference	-18		13	
C9-2	Impact	30	24	8	n/a
C9-4	Reference	6		0	

Site	Site type	% deviation of 2016 relative to baseline^	Difference between % deviation of impact relative to reference quadrats for 2016 – baseline^	% deviation of 2016 sites relative to 2015 sites	Difference between % deviation of impact relative to reference quadrats for 2016 - 2015
E1b-1	Impact	-2	n/a	0	n/a
E1b-2	Reference	41		0	
E3-1	Impact	17	n/a	0	n/a
E3-2	Reference	11		0	
E1b-8	Impact	14	n/a	0	n/a
E1b-7	Reference	11		0	
A7b-2	Impact	4	n/a	0	n/a
A7b-1	Reference	20		9	
E3-3	Impact	4	n/a	0	n/a
E3-4	Reference	3		0	
A7b-4	Impact	0	n/a	0	n/a
A7b-3	Reference	4		14	
E1b-3	Impact	19	n/a	0	n/a
E1b-4	Reference	11		0	
E1b-5	Impact	-3	n/a	0	n/a
E1b-6	Reference	14		0	
E1b-10	Impact	29	-21	9	n/a
E1b-9	Reference	50		14	
E3-5	Impact	4	n/a	0	n/a
E3-6	Reference	14		0	

^Baseline was derived from mean overall foliar cover (%) for 2011, 2012, 2013, n/a = not applicable as the deviation is less than 25% no further investigation is required

3.2.2 Infrastructure Corridor

Foliar cover, condition and other attributes

The overall foliar cover (%) data for the 2016 survey mostly remained consistent with the 2015 data for the Infrastructure Corridor with minimal or no changes recorded. Eighteen sites (E9-1, E9-2, S8-1, S8-2, S8-5, S8-6, E4-2, E4-3, E4-7, E4-10, E4-11, E4-12, A2-4, A2-5, A2-7, A2-11, A2-12 and A7b-6) recorded

an increase in overall foliar cover, from 2015 to 2016, ranging between 5% and 10%. No sites recorded a decrease in overall cover.

The overstorey cover (%) did not vary much between 2015 and 2016. Three sites (E9-1, E4-5 and E4-9) had an increase in overstorey cover ranging between 2.5% to 5%, while four sites (A7b-5, A7b-6, S8-1 and E4-2) had a reduction in overstorey cover ranging from 1% to 25%. The reduction in overstorey cover at these sites was due to lightning initiated fire in the past, which killed some trees/shrubs or branches which have now fallen.

The midstorey cover increased at 13 sites (E9-1, S8-3, S8-2, E4-2, E4-5, E4-6, E4-7, E4-10, E4-12, E4-13, A2-11, A2-12 and A7b-8) ranging between 1% and 5%. One site (A2-5) had a reduction in midstorey cover of 5%.

There was an increase in the understorey cover for eight sites (S8-1, S8-6, E4-12, A2-7, A2-10, A2-11, A2-12 and A7b-5) ranging between 0.5% and 20%. There was a reduction in understorey cover of 5% at site A2-6 is due to some senescence of *Triodia* spp. (a natural part of its lifecycle). The raw data for foliar cover from 2011 to 2016 is presented in **Appendix H**.

The raw data for foliar condition (browning scale and leaf loss scale) had a similar result seen in the Operations Area. The foliar condition for the overstorey and midstorey was mostly recorded as green (healthy) with occasional yellow (senescent) for the 2016 survey. The understorey was mostly recorded from green (healthy) to yellow (senescent). No sites were recorded as brown (dead of dying) within the 2016 survey. Overall within the infrastructure corridor, the vegetation was healthy and recruitment was adequate.

The leaf loss scale for 2015 recorded mostly 4 to 5, with 5 indicating a full canopy of leaves. On occasion, a score of 3 was recorded. For some sites this was due to lightning initiated fire in the past, which has killed some vegetation (though leaves were retained in places and have died, this was particularly seen with *Acacias*). Similarly, to the Operations Area, other sites where a leaf loss scale of 3 or 4 was recorded are showing typical response to climatic conditions at the time of the survey (e.g. annual species dying off). As the lower leaf loss scales recorded for some sites are due to natural processes, they do not require further investigation. The raw data for foliar condition (browning scale and leaf loss scale) is presented in **Appendix I**.

No signs of erosion or deposition were recorded in any quadrats during the 2016 survey.

Evaluation of data against vegetation monitoring triggers

Comparisons of overall foliar cover (%) were made for the impact sites between 2016 and 2015 data and the 2016 data was compared against the baseline (comprising mean overall foliar cover (%) for 2011, 2012 and 2013). **Table 6** presents the overall foliar cover deviation values for the two comparisons with the colour-coded flags (as described in Section 2.3). It also shows the difference between impact sites relative to the reference site for impact sites that had an overall foliar cover (deviation of more than 25%) between 2015 and 2014 data and 2015 data compared against the baseline.

A comparison between 2016 and the baseline dataset identified 11 impact sites (A2-4, A2-6, E4-2, E4-3, E4-11, E4-14, A7b-6, A7b-7, S8-2, S8-3 and S8-7) that had an overall foliar cover deviation of 25% or more. Four of these impact sites (E4-11, S8-2, S8-3 and S8-7) showed a decrease in overall foliar cover. The paired reference sites also experienced a decrease in foliar cover in comparison to the baseline.

These sites experienced foliar loss in comparison to the baseline data in the 2015 survey due to post-fire regeneration. These sites have stayed the same or increased in foliar cover in comparison to the 2015 survey. Comparisons between the deviation of these impact sites with their respective reference site show the deviation is no more than 25%, therefore, there was no requirement to further investigate under Trigger 1.

Three sites (A2-6, E4-2 and A7b-6) had a deviation of over 25% compared to their respective reference sites, however this was due to an increase in vegetation cover and therefore does not require further investigations under Trigger 1. Site A7b-6 also had a deviation of 25% overall cover, due to an increase in vegetation cover, between 2015 and 2016. This was due to growth of post-fire vegetation at this site, resulting in additional 10% cover. As the 25% deviation was due to an increase in vegetation cover and not due to mining related activities, there was no requirement to further investigate under Trigger 1.

Three individuals of the introduced species (weed) *Salvia verbenaca* (Wild Sage) were recorded at site A3-3 and one individual was recorded at site A3-4 and therefore Trigger 5 (Identification of a weed species in a site where it had not previously been recorded) was exceeded. Trigger 6 (25% increase of weed species in abundance or cover relevant to reference site) while it relates to weeds, does not require investigation in this year of monitoring as there is no baseline to compare to.

Table 6: Overall foliar cover deviation (%) for impact sites in the Infrastructure Corridor sites

Site	Site type	% deviation of 2016 relative to baseline*	Difference between % deviation of impact relative to reference quadrats for 2016 - baseline*	% deviation of 2016 sites relative to 2015 sites	Difference between % deviation of impact relative to reference quadrats for 2016 - 2015
A3-2	Impact	-18	n/a	0	n/a
A3-1	Reference	-20		0	
A3-4	Impact	11	n/a	0	n/a
A3-3	Reference	17		0	
A3-5	Impact	6	n/a	0	n/a
A3-6	Reference	-3		0	
E9-6	Impact	0	n/a	0	n/a
E9-5	Reference	-8		0	
E9-2	Impact	15	n/a	11	n/a
E9-1	Reference	67		29	
A2-6	Impact	38	35	0	n/a
A2-5	Reference	3		10	
E4-3	Impact	29	9	13	n/a
E4-4	Reference	20		0	

Site	Site type	% deviation of 2016 relative to baseline*	Difference between % deviation of impact relative to reference quadrats for 2016 - baseline*	% deviation of 2016 sites relative to 2015 sites	Difference between % deviation of impact relative to reference quadrats for 2016 - 2015
E4-5	Impact	5	n/a	0	n/a
E4-6	Reference	-18		-83	
E4-2	Impact	30	39	11	n/a
E4-1	Reference	-9		0	
A2-1	Impact	14	n/a	0	n/a
A2-7	Reference	50		50	
A2-9	Impact	18	n/a	0	n/a
A2-8	Reference	66		0	
E4-7	Impact	14	n/a	14	n/a
E4-8	Reference	20		0	
A2-2	Impact	3	n/a	0	n/a
A2-10	Reference	-4		0	
E4-9	Impact	-10	n/a	0	n/a
E4-10	Reference	2		8	
A2-3	Impact	13	n/a	0	n/a
A2-11	Reference	10		10	
E4-11	Impact	-34	-15	17	n/a
E4-12	Reference	-19		40	
S8-2	Impact	-40	-13	17	n/a
S8-6	Reference	-27		14	
S8-3	Impact	-40	6	0	n/a
S8-1	Reference	-46		17	
S8-4	Impact	-4	n/a	0	n/a
S8-7	Impact	-40	0	0	n/a
S8-5	Reference	-40		17	
A2-4	Impact	27	-19	10	n/a
A2-12	Reference	46		14	

Site	Site type	% deviation of 2016 relative to baseline*	Difference between % deviation of impact relative to reference quadrats for 2016 - baseline*	% deviation of 2016 sites relative to 2015 sites	Difference between % deviation of impact relative to reference quadrats for 2016 - 2015
E4-14	Impact	29	-17	0	n/a
E4-13	Reference	45		0	
A7b-6	Impact	30	53	25	25
A7b-5	Reference	-23		0	
A7b-7	Impact	25	20	0	n/a
A7b-9	Impact	5	n/a	0	n/a
A7b-8	Reference	-8		0	

* S8-7 and A7b-9 were established in 2012 due to approved mining activities resulting in sites S8-4 and A7b-7 being disturbed. The paired reference sites remain the same.

^Baseline was derived from mean overall foliar cover (%) for 2011, 2012, 2013

n/a = not applicable as the deviation is less than 25% no further investigation is required

3.2.3 Process Water Supply Borefield

Foliar cover, condition and other attributes

The foliar cover (%) data for the 2016 survey mostly remained consistent with the 2015 data for the Process Water Supply Borefield with minimal or no changes recorded. No sites recorded a decrease in overall foliar cover in comparison to 2015, while 18 sites (E2-1, E2-4, E2-5, X1-4, X1-8, X1-9, X1-10, X1-11, X1-12, X1-13, X1-14, X1-15, X1-16, M1-1, M1-2, M1-4, T1-3 and T1-2) recorded an increase in foliar cover of no more than 10%.

The overstorey slightly increased in foliar cover (%) for one site (X1-2) and no sites recorded a decrease in foliar cover. The midstorey increased in foliar coverage for 11 sites (E2-1, E2-4, X1-2, X1-4, X1-8, X1-9, X1-11, X1-12, X1-13, X1-14 and T1-2) ranging between 1% and 10%, while two sites (M1-2 and M1-4) had a slight decrease in foliar cover due to some post-fire species growing taller and moving into the mid-storey. The understorey increased in foliar coverage for 12 sites (E2-1, E2-5, X1-1, X1-2, X1-9, X1-14, X1-15, X1-16, M1-1, M1-2, M1-4 and T1-3) by no more than 15%. There was a decrease in foliar cover for two sites (X1-4 and X1-11) ranging between 1% and 10%, this was due to some annual grasses dying off.

The raw data for foliar cover between 2011 and 2015 is presented in **Appendix J**.

The raw data for foliar condition (browning scale) indicated that the foliar condition for the overstorey and midstorey, where present (these layers were sometimes absent in burnt sites), was predominately green (healthy) for the 2016 survey. Only one site (M1-2) recorded brown (dead) foliar, this was in the midstorey and was due to the post-fire successional species: *Codonocarpus cotinifolius* reaching the end of its

lifespan and dying off. The understorey was mostly recorded as green (healthy) to yellow (senescent). Overall within the Process Water Supply Borefield, the vegetation was healthy and recruitment was adequate. The leaf loss scale recorded in 2016 for the over, mid and understorey were either 4 or 5, with 5 indicating a full canopy of leaves. A rating of 2 was recorded in the midstorey for two sites but this was not considered significant as it was due to the natural senescence of *Codonocarpus cotinifolius*. The raw data for foliar condition (browning scale and leaf loss scale) is present in **Appendix K**.

No signs of erosion or deposition were recorded in any quadrats during the 2016 survey.

Evaluation of data against vegetation monitoring triggers

Comparisons of overall foliar cover (%) were made for the impact sites between 2016 and 2015 data and the 2016 data was compared against the baseline (comprising mean overall foliar cover for 2011, 2012 and 2013). **Table 7** presents the overall foliar cover deviation values for the two comparisons with the colour-coded flags (as described in Section 2.3). It also shows the difference between impact sites relative to the reference sites, for impact sites that had an overall foliar cover deviation of more than 25%.

A comparison between the 2016 survey and the baseline data identified four impact sites (E2-5, X1-1, X1-7 and X1-9) with a decrease in overall foliar cover by more than 25%. Of these, when the impact sites were compared to the paired reference sites, one impact site (X1-9) had a negative difference of -57% relative to the paired reference site. This difference was also seen in the 2015 survey and is the result of a lightning initiated fire which went through the area in 2012. This site is continuing to regenerate post-fire (**Figure 9**). The remaining sites, did not show a decreasing trend relative to their reference site. As these results are not due to mining related activities, they do not need further investigations under Trigger 1.

There were no sites that had a decrease in overall foliar cover from 2015 to 2016. Four impact sites (E2-5, X1-1, E2-1 and X1-15) had an overall increase in cover of more than 25% between 2015 and 2016. Of these, sites E2-5 and E2-1, had a difference in deviation for overall foliar cover of greater than 25% when compared to the reference site (E2-4). However, given that the deviation was an increase in cover, no further investigations were required under Trigger 1.

No weed species were recorded in any quadrats during the 2016 survey in the Process Water Supply Borefield, and therefore Trigger 5 and Trigger 6 were not exceeded.

Table 7: Overall foliar cover deviation (%) for impact sites in the Water Supply Borefield

Site	Site type	% deviation of 2016 relative to baseline*	Difference between % deviation of impact relative to reference quadrats for 2016 - baseline*	% deviation of 2016 sites relative to 2015 sites	Difference between % deviation of impact relative to reference quadrats for 2016 - 2015
E2-5	Impact	-35	3	25	25
E2-6	Reference	-38		0	
X1-1	Impact	-40	35	0	n/a
X1-2	Reference	-75		0	

Site	Site type	% deviation of 2016 relative to baseline*	Difference between % deviation of impact relative to reference quadrats for 2016 - baseline*	% deviation of 2016 sites relative to 2015 sites	Difference between % deviation of impact relative to reference quadrats for 2016 - 2015
E2-1	Impact	6	n/a	50	33
E2-4	Reference	-32		17	
E2-2	Impact	3	n/a	0	n/a
E2-3	Reference	-13		0	
X1-15	Impact	-16	n/a	25	-8
X1-16	Reference	-39		33	
X1-11	Impact	-22	n/a	17	2
X1-12	Reference	14		14	
T1-3	Impact	18	n/a	14	n/a
T1-1	Reference	49		0	
T1-4	Impact	39	16	0	n/a
T1-2	Reference	23		13	
X1-13	Impact	-17	n/a	20	n/a
X1-14	Reference	-11		14	
X1-9	Impact	-25	-57	20	n/a
X1-10	Reference	32		8	
X1-7	Impact	-25	-2	0	n/a
X1-8	Reference	-23		50	
X1-4	Impact	14	n/a	14	n/a
X1-6	Reference	68		0	
X1-3	Impact	-23	n/a	0	n/a
X1-5	Reference	32		0	
M1-1	Impact	n/a	n/a	11	n/a
M1-2	Reference	n/a		67	
M1-3	Impact	n/a	n/a	0	n/a
M1-4	Reference	n/a		9	

^Baseline was derived from mean overall foliar cover (%) for 2011, 2012, 2013; n/a = not applicable as the deviation if less than 25% no further investigation is required

2015

2016

Figure 9: An example of healthy post-fire recruitment at impact site X1-9 burnt in 2012

3.3 Indicator species

During the 2015 survey, species were selected to be used as appropriate indicators in assessing against Trigger 2. Trigger 2 is described as '25% deviation of indicator species within monitoring (impact) sites relative to reference sites'. A single indicator species was selected for each paired site. Species selected for the sites within each of the core areas along with density/ cover values for each species are presented in **Appendix L**. The same indicator species were analysed in the 2016 survey.

The 2016 survey found that there was no reduction in cover or number of individuals when compared to the 2015 data. The overall cover for these species either stayed the same or increased between 0.25% and 10%. Where there had been an increase in cover, an increase in the number of individual plants had also been recorded.

3.4 Photographic monitoring

Photographs for each quadrat are presented for the 2011 through to 2016 surveys in **Appendix M**. The 2015 photographs include those taken in April at six months following the 2014 survey along with photographs taken in October, during the 2015 monitoring survey.

The photographic monitoring supports the findings of the vegetation condition assessment, showing no sign of non-approved or indirect impacts from the Project are occurring. The photographs also demonstrated that overall foliar covers remained stable between the years 2015 and 2016.

4 Discussion

4.1 Remote sensing

Remote sensing detected changes between 2015 and 2016 resulting from approved additional mine infrastructure development (e.g. roads, borrow pits, airstrip, operational areas), changes in canopy vigour, fluctuating in groundcover along some road sections, bare ground and drainage lines, and fluctuations in the water levels of water bodies associated with the mine. Changes were also detected as a result of lightning initiated fire in the vicinity of Mine Section 4 and Mine Sections 2 and 10 and other areas show changes as a result of vegetation recovery following previous fires.

The analysis did not detect any changes in vegetation that were directly or indirectly attributable as an impact from the Project and therefore there is no requirement for further investigation for any of the vegetation monitoring triggers. Furthermore, no significant change was detected within any of the field monitoring sites. The results of the remote sensing analysis were consistent with field survey results and confirm the process as a sensitive and robust tool for quantitatively measuring change.

4.2 Operations Area

The results of the vegetation cover assessment of the sites in the Operations Area indicated that the percentage foliar cover remained stable during the 2015 to 2016 assessment, with minimal or no changes recorded.

Assessment between 2016 and the baseline data found the small changes that were detected were due to natural processes, particularly termites, senescence of older vegetation and climatic influences (e.g. annual species dying off and *Triodia* spp. dying back which is part of its lifecycle in drier times). No trends indicating an ongoing decline in vegetation cover were observed in the operations area.

Similarly, the foliar condition (browning scale and leaf loss scale) results indicated vegetation in the upper storey and midstorey to be healthy. While foliar condition in the understorey shows evidence of some vegetation yellowing, this is due to a large presence of annual species dying off and *Triodia* spp. in some sites (where dying off is a natural part of its lifecycle). Foliar cover and condition results indicates that no impacts, such as dust, are occurring from the Project. This is further supported by the findings from the remote sensing. No signs of erosion or deposition were recorded in any quadrats during the 2016 survey.

One site had a decrease in overall foliar cover by more than 25% in comparison to the baseline. When the deviation of this site was compared to the reference site, however the deviation was less than 25%. As noted in previous years, this variation is likely due to termite activity and natural senescence of *Triodia* and not due to the Project activities. The comparison of impact sites and paired reference sites showed no overall foliar cover deviation decrease of more than 25% for the 2016-2015 assessment. As a result, further investigation of Trigger 1 was not required.

No weed species were recorded in any quadrats in the Operations Area, and therefore Trigger 5 (Identification of a weed species in a site where it had not previously been recorded) and Trigger 6 (25% increase of weed species in abundance or cover relevant to reference site) do not require further investigation. While no weed species were recorded, it is recommended that weed hygiene measures are continually maintained to prevent the introduction and spread of weeds.

4.3 Infrastructure Corridor

The results of the vegetation cover assessment of the sites in the Infrastructure Corridor found that the foliar covers remained stable during the 2015 to 2016 assessment, with minimal or no changes recorded. To determine if any changes have occurred between 2016 and the baseline data an assessment was undertaken against vegetation monitoring Trigger 1. Small decreases observed in vegetation cover were attributed to lightning initiated fire in the past, and annual species die off, and senescence of older vegetation.

The foliar condition (browning scale and leaf loss scale) was similar to the results from the Operations Area, indicating the vegetation is maintaining good health with typical responses to climatic conditions (e.g. annual species drying off, drought). There were some signs of yellow senescence occurring but this can be attributed to the variation from the climatic conditions. No signs of erosion or deposition were recorded in any quadrats during the 2016 survey.

Four impact sites (E4-11, S8-2, S8-3 and S8-7) had a decrease in overall foliar cover which exceeded 25% deviation for the 2016-baseline comparison. The same four sites experienced similar loss over 25% in the 2015 survey. These sites have all been burnt and are currently experiencing post-fire regeneration. Comparisons between the deviation of these impact sites with their respective reference site show the deviation is no more than 25%, or were an increase in cover of more than 25%, therefore no further investigation was required under Trigger 1.

Three individuals of the introduced species (weed) *Salvia verbenaca* (Wild Sage) were recorded at site A3-3 and one was recorded at site A3-4. During the 2015 survey this weed species was recorded approximately 50 m from site A3-4, and it has likely spread further due to above average rainfall received in the 12 months prior to the survey. This site is located in the Pinjin Pastoral Station, which is an active cattle station and therefore the occurrence of this weed in these sites is likely to be related to pastoral activity. As a result of weeds being recorded in these quadrats, Trigger 5 (Identification of a weed species in a site where it had not previously been recorded) was exceeded. Trigger 6, which is: 25% increase of weed species in abundance or cover relevant to reference site, did not require investigation in this year of monitoring as this was the first year weeds have been recorded and there is therefore no baseline data to compare to. In the next round of monitoring (2017) assessments will need to be made against Trigger 6 at sites A3-3 and A3-4.

4.4 Process Water Supply Borefield

The results of the vegetation cover assessment of the sites in the Process Water Supply Borefield show the foliar cover for the 2016 survey remained relatively consistent with the 2015 results. Small changes that were observed were mostly attributed to annual species die off or were a result of post-fire regeneration where the vegetation was maturing and structural changes occurred (e.g. Shrubs previously in the understorey are now recorded as cover in the midstorey, senescence of species at the end of their lifecycle).

The foliar condition results for the 2016 survey indicated that the vegetation is healthy (predominately green in colour) in the Process Water Supply Borefield, with the only yellow or brown vegetation recorded in the midstorey and understorey due to the post-fire successional species: *Codonocarpus cotinifolius* reaching the end of its lifespan and dying off and also dying off of annual species at the end of their growing season. The leaf loss scale recorded in 2016 for the over, mid and understorey were either 4 or 5, with 5 indicating a full canopy of leaves. A rating of 2 was recorded in the midstorey for two sites but

this was not considered significant as it was due to natural senescence of some post-fire successional species.

In total four impact sites (E2-5, X1-1, X1-7 and X1-9) had a decrease in deviation of overall foliar cover which exceeded 25% relative to the 2016 baseline comparison. Of these, one site, X1-9 also had a negative difference of -57% relative to the paired reference site, which exceeded the 25% deviation under Trigger 1. This difference is consistent with results from 2015, and is due to a lightning initiated fire that burnt the site in 2012. This site continues to have healthy regeneration.

As the vegetation cover decline is due to a fire and is successfully regenerating, no further investigation was required under Trigger 1. There were no sites that had a decrease in overall foliar cover from 2015 to 2016.

No weed species were recorded in any quadrats in the Process Water Supply Borefield, and therefore Trigger 5 (Identification of a weed species in a site where it had not previously been recorded) and Trigger 6 (25% increase of weed species in abundance or cover relevant to reference site) do not require further investigation. While no weed species were recorded, it is recommended that weed hygiene measures are continually maintained to prevent the introduction and spread of weeds.

4.5 Indicator species

The 2016 survey found that there was no loss in cover or number of individuals when compared to the 2015 data and that in some places there was an increase. As with the foliar condition and cover, a baseline of three years should be established for the indicator species. This would be more appropriate as it would capture the year to year variability of the study area as a result of climatic influences, which provides a more robust baseline given the five-year duration of monitoring to date.

4.6 Summary and recommendations

Overall no impact sites in any of the three core areas required further investigation under Triggers 1 and 2.

Trigger 5 (Identification of a weed species in a site where it had not previously been recorded) was exceeded as weed species were found at sites A3-3 and A3-4. Trigger 6 (25% increase of weed species in abundance or cover relevant to reference site) however did not require investigation as this was the first year weeds have been recorded in the quadrats.

Recommendations arising from the 2016 VMP include:

- Monitor the current known locations of *Salvia verbenaca* and take action to prevent it spreading further
- Continually maintain weed hygiene measures to prevent the introduction and spread of new weeds
- Advise personnel to keep to pre-existing tracks and avoid unnecessary damage to vegetation through ‘bush bashing’
- It was noted some sites had missing site number tags (sites A7a-1, M1-1, M1-2, M1-3 and M1-4) – new tags should be affixed to north-west corner post of these sites during the next monitoring program.

References

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Bureau of Meteorology (BOM). 2016. Climate Data Online for Laverton Aero weather station. Accessed online January 2016 http://www.bom.gov.au/climate/data/?ref=ftr

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Eco Logical Australia (ELA). 2011. *Tropicana Gold Project: Vegetation Monitoring Program – 2011 Baseline Survey*. Prepared for Tropicana Joint Venture.

Eco Logical Australia (ELA) and Tropicana Joint Venture (JV) 2011. *Tropicana Gold Project – Vegetation Monitoring Strategy*. Report prepared for AngloGold Ashanti Australia and Independence Group NL, June 2011.

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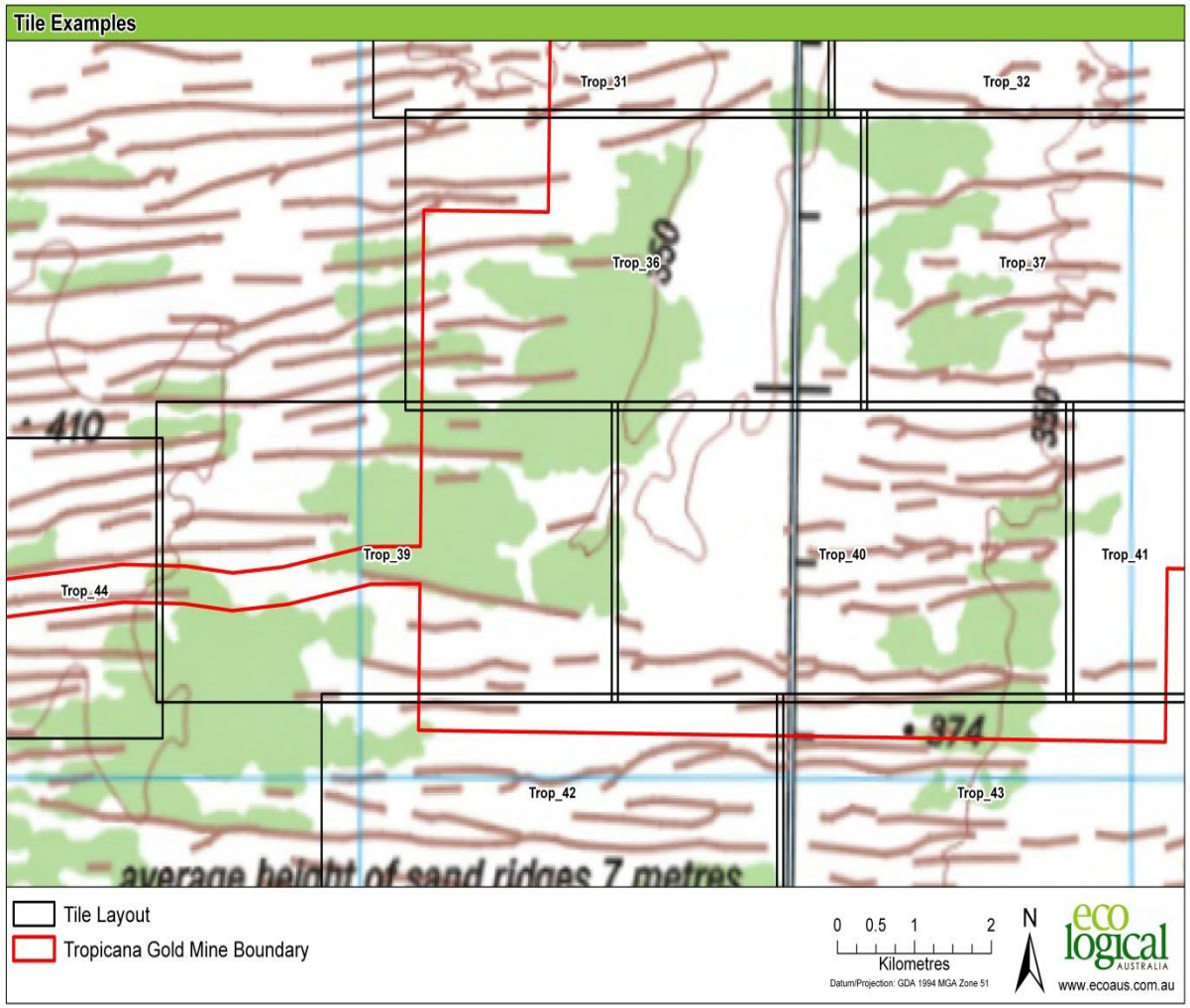
Appendix A : DMSI visual assessment outputs

Pictures of the remotely sensed data for 2015, 2016 and the SAVI change detection are provided on disk. Data are separated into image tiles for ease of comparison. The tile layout and a zoomed in section of the tile layout are provided below.



Appendix B : Quadrat locations and details

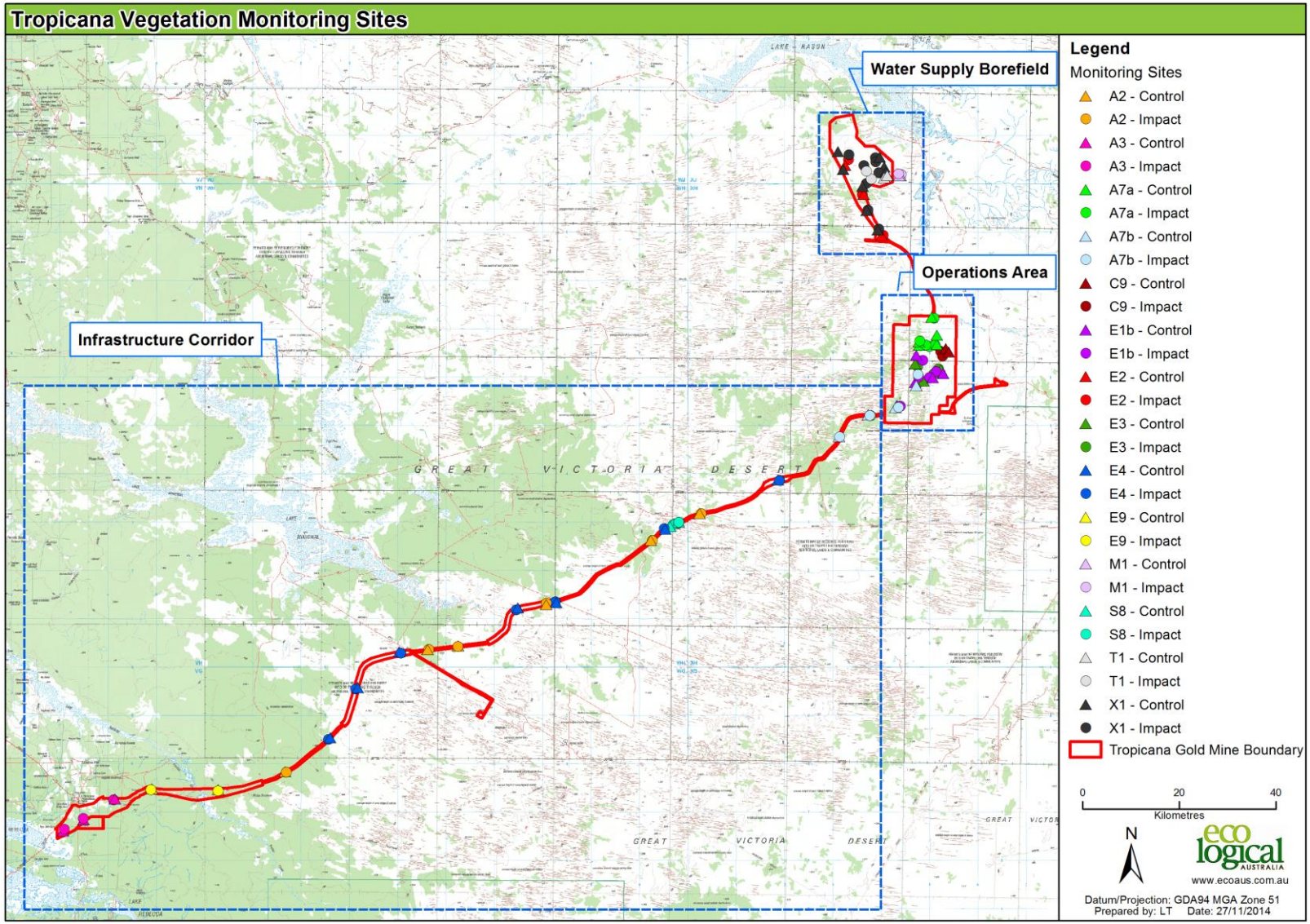
Site name	Latitude	Longitude	Treatment	Vegetation community
Operations Area				
A7A-1	-29.22353	124.54416	Impact	*Acacia aneura* woodlands over grasses +/- *Triodia basedowii*
A7A-4	-29.20206	124.55977	Reference	
A7A-2	-29.22067	124.55582	Impact	
A7A-3	-29.21881	124.55957	Reference	
A7A-5	-29.17022	124.55268	Impact	
A7A-6	-29.1686	124.54745	Reference	
A7A-8	-29.22079	124.53609	Impact	
A7A-7	-29.22108	124.52236	Reference	
A7A-10	-29.21327	124.5229	Impact	
A7A-9	-29.21453	124.52184	Reference	
E3-1	-29.26139	124.51906	Impact	Occasional *Eucalyptus gongylocarpa* over mixed upper stratum over *Daviesia grahamii/Pityrodia loricata/Chrysocephalum puteale* low shrubland over sparse to open *Triodia desertorum* or *T. basedowii* and *Lomandra leucocephala* subsp. *robusta*
E3-2	-29.25589	124.51441	Reference	
E3-3	-29.26533	124.56357	Impact	
E3-4	-29.26552	124.56877	Reference	
E3-5	-29.27398	124.55448	Impact	
E3-6	-29.2877	124.53194	Reference	
E1B-1	-29.24937	124.53009	Impact	Open *Eucalyptus youngiana* and sparse *Callitris preissii* over mixed shrubs over open to moderately dense *Triodia basedowii*
E1B-2	-29.23972	124.51599	Reference	
E1B-3	-29.27014	124.55874	Impact	
E1B-4	-29.27303	124.5738	Reference	
E1B-5	-29.28137	124.54474	Impact	
E1B-6	-29.28119	124.55158	Reference	
E1B-8	-29.2807	124.52136	Impact	
E1B-7	-29.29069	124.51486	Reference	
E1B-10	-29.33537	124.48317	Impact	
E1B-9	-29.33378	124.47629	Reference	
A7B-2	-29.27574	124.51965	Impact	Open to moderately dense *Acacia aneura* over *Aluta maisonneuvei* subsp. *auriculata* / *Acacia ramulosa* var.
A7B-1	-29.29621	124.51709	Reference	

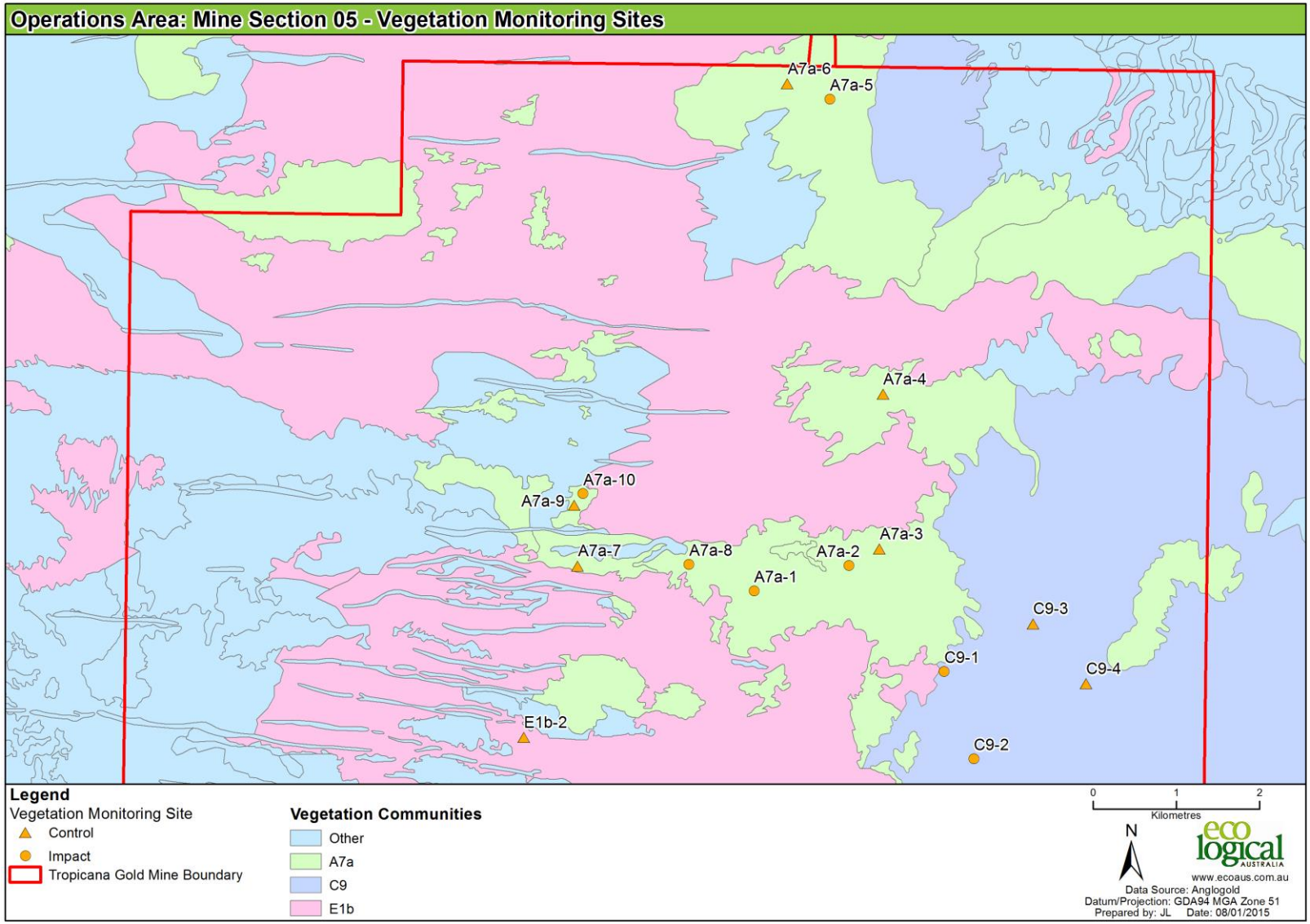
Site name	Latitude	Longitude	Treatment	Vegetation community
A7B-4	-29.33791	124.47997	Impact	*ramulosa* over *Eremophila forrestii* subsp. *forrestii* over *Triodia basedowii*
A7B-3	-29.33805	124.47349	Reference	
C9-1	-29.232	124.56774	Impact	Open to moderately dense *Casuarina pauper* woodland over open mixed shrubs and scattered soft grasses and/or *Triodia scariosa*
C9-3	-29.22669	124.57865	Reference	
C9-2	-29.24138	124.57154	Impact	
C9-4	-29.2331	124.58527	Reference	
Infrastructure Corridor				
E9-2	-30.06177	123.02964	Impact	Low Open Woodland of *Eucalyptus concinna* with *Eucalyptus spp*. over *Eremophila scoparia*, *Acacia hemiteles, Acacia colletioides, Scaevola spinescens* and *Eremophila caperata* over *Triodia scariosa*. This community occurs on orange sandy loams on flats.
E9-1	-30.05935	123.03026	Reference	
E9-6	-30.05983	122.88569	Impact	
E9-5	-30.05797	122.88797	Reference	
A3-2	-30.13366	122.69965	Impact	Low Open Woodland to Tall Open Shrubland of *Acacia ayersiana* and *Acacia aneura* var. *aneura* over *Acacia spp*. and mixed shrubs. This community occurs on orange sandy loams
A3-1	-30.13646	122.69748	Reference	
A3-4	-30.1135	122.74053	Impact	
A3-3	-30.11531	122.74101	Reference	
A3-5	-30.07888	122.80564	Impact	
A3-6	-30.07624	122.80871	Reference	
S8-3	-29.5601	124.00667	Impact	Low Shrubland of *Acacia desertorum* var. *desertorum* with *Grevillea juncifolia*, low Myrtaceous shrubs and mixed low shrubs with occasional emergent *Eucalyptus youngiana* and *Eucalyptus spp.* This community occurs on pale orange sandy loams on flats
S8-1	-29.55902	124.00424	Reference	
S8-2	-29.56185	124.00079	Impact	
S8-6	-29.56442	123.99559	Reference	
S8-4	-29.55795	124.01273	Impact	
S8-7	-29.5567	124.01356	Impact	
S8-5	-29.55566	124.01362	Reference	
E4-2	-29.80427	123.42075	Impact	Low Woodland to Low Open Woodland of *Eucalyptus gongylocarpa* with *Callitris preissii* and *Eucalyptus spp*. over mixed shrubs over *Triodia spp*. This community occurs on orange, red-orange, yellow-orange and yellow sandy loams on mixed topographies
E4-1	-29.80187	123.41777	Reference	
E4-3	-29.96562	123.26614	Impact	
E4-4	-29.96245	123.27089	Reference	
E4-5	-29.87154	123.32471	Impact	

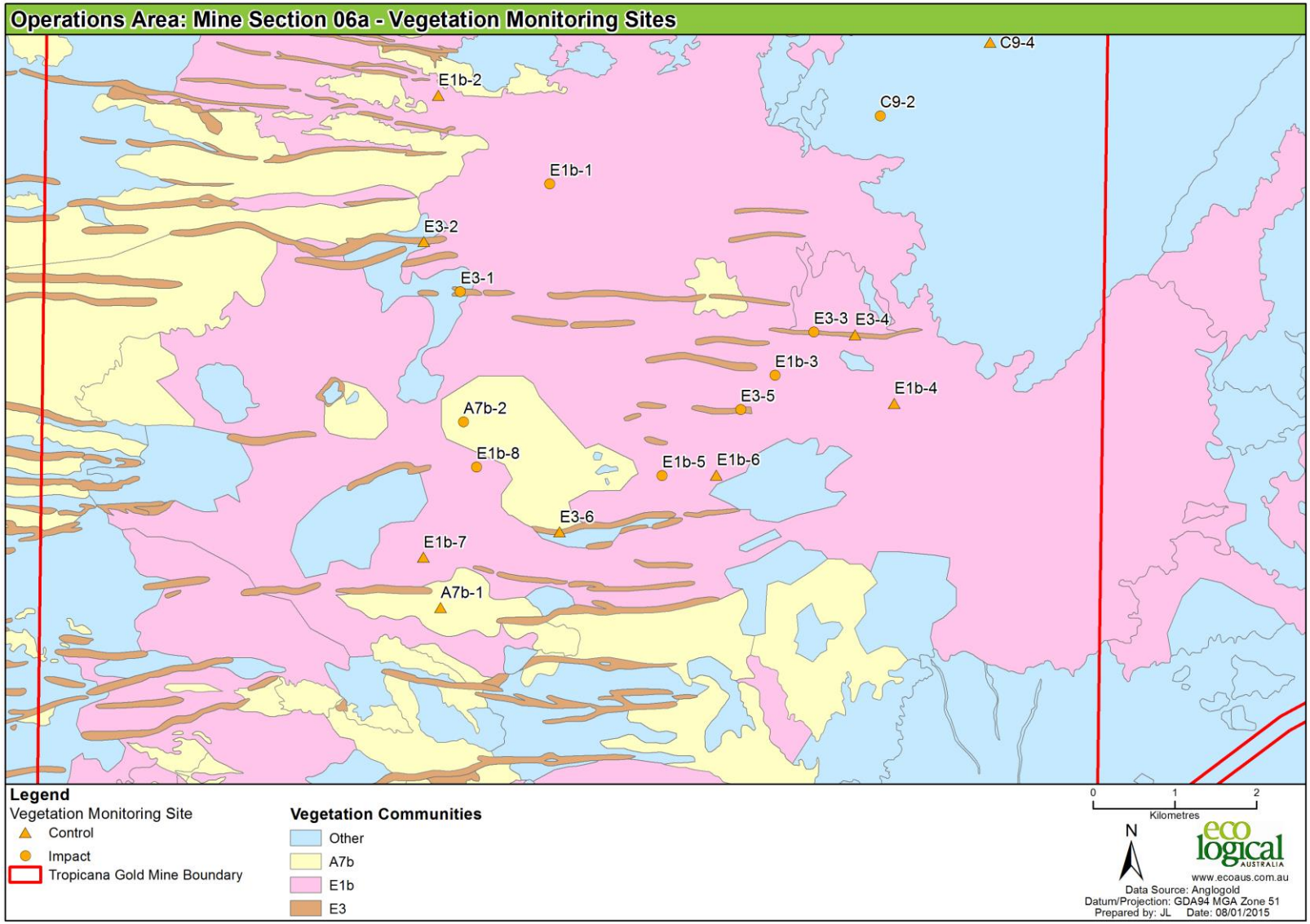
Site name	Latitude	Longitude	Treatment	Vegetation community
E4-6	-29.86894	123.32907	Reference	
E4-7	-29.72284	123.66718	Impact	
E4-8	-29.71848	123.67104	Reference	
E4-9	-29.70646	123.75116	Impact	
E4-10	-29.70804	123.75318	Reference	
E4-11	-29.56846	123.98227	Impact	
E4-12	-29.56914	123.98532	Reference	
E4-14	-29.47713	124.22742	Impact	
E4-13	-29.47554	124.22452	Reference	
A2-1	-29.7975	123.4812	Impact	Low Woodland to Tall Shrubland of *Acacia ayersiana* and *Acacia aneura* var. *aneura* with *Acacia aneura* var. *argentea* over *Eremophila spp*., *Aluta maisonneuvei* subsp. *auriculata* and *Prostanthera spp*. This community occurs on orange sandy loam
A2-7	-29.79695	123.4785	Reference	
A2-2	-29.70986	123.7316	Impact	
A2-10	-29.71198	123.7317	Reference	
A2-3	-29.59098	123.95703	Impact	
A2-11	-29.59075	123.9545	Reference	
A2-4	-29.54005	124.06123	Impact	
A2-12	-29.53954	124.05796	Reference	
A2-6	-30.02674	123.17591	Impact	
A2-5	-30.02572	123.17397	Reference	
A2-9	-29.79106	123.54354	Impact	
A2-8	-29.78967	123.54379	Reference	
A7B-6	-29.39442	124.35442	Impact	Open to moderately dense *Acacia aneura* over *Aluta maisonneuvei* subsp. *auriculata* / *Acacia ramulosa* var. *ramulosa* over *Eremophila forrestii* subsp. *forrestii* over *Triodia basedowii*
A7B-5	-29.39369	124.35364	Reference	
A7B-7	-29.35357	124.41985	Impact	
A7B-9	-29.35352	124.41888	Impact	
A7B-8	-29.35167	124.4156	Reference	
Water Supply Borefield				
E2-1	-28.94181	124.39672	Impact	
E2-4	-28.94109	124.40065	Reference	

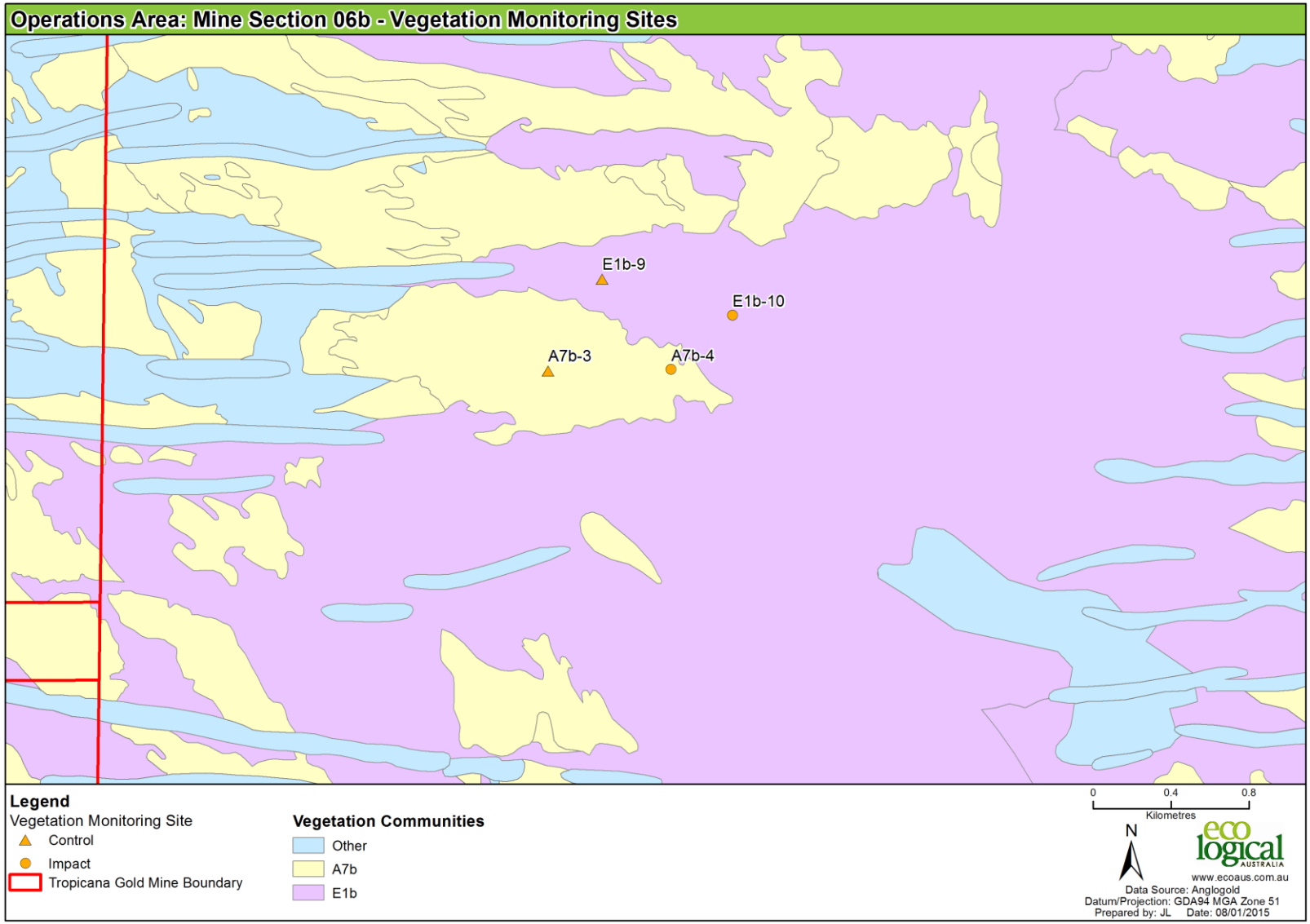
Site name	Latitude	Longitude	Treatment	Vegetation community
E2-2	-28.87624	124.36713	Impact	*Eucalyptus gongylocarpa* over mixed *Acacia* spp. over mixed moderately open to moderately dense shrubs over *Triodia basedowii*
E2-3	-28.88708	124.35986	Reference	
E2-5	-29.01685	124.44234	Impact	
E2-6	-29.01686	124.43948	Reference	
X1-1	-29.00525	124.43319	Impact	Mixed Eucalypt woodlands dominated by *Eucalyptus gongylocarpa/ E. youngiana* over mixed open shrubs and *Triodia basedowi*i
X1-2	-29.00674	124.43163	Reference	
X1-3	-28.87242	124.42353	Impact	
X1-5	-28.87106	124.43335	Reference	
X1-4	-28.88026	124.42482	Impact	
X1-6	-28.8887	124.44297	Reference	
X1-7	-28.90014	124.43136	Impact	
X1-8	-28.89963	124.44631	Reference	
X1-9	-28.86753	124.36771	Impact	
X1-10	-28.86117	124.34488	Reference	
X1-11	-28.92043	124.40539	Impact	
X1-12	-28.92559	124.39786	Reference	
X1-13	-28.88746	124.39931	Impact	
X1-14	-28.89446	124.35574	Reference	
X1-15	-28.97024	124.40909	Impact	
X1-16	-28.97075	124.40729	Reference	
M1-1	-28.9017	124.4733	Impact	Moderately dense to dense *Acacia aneura* woodland over isolated shrubs over scattered *Triodia basedowii*.
M1-2	-28.9054	124.4746	Reference	
M1-3	-28.9029	124.479	Impact	
M1-4	-28.9054	124.4782	Reference	
T1-3	-28.91204	124.41596	Impact	Open to moderately open mixed shrubs over *Triodia basedowii*
T1-1	-28.9089	124.44324	Reference	
T1-4	-28.89736	124.40519	Impact	
T1-2	-28.90475	124.44995	Reference	

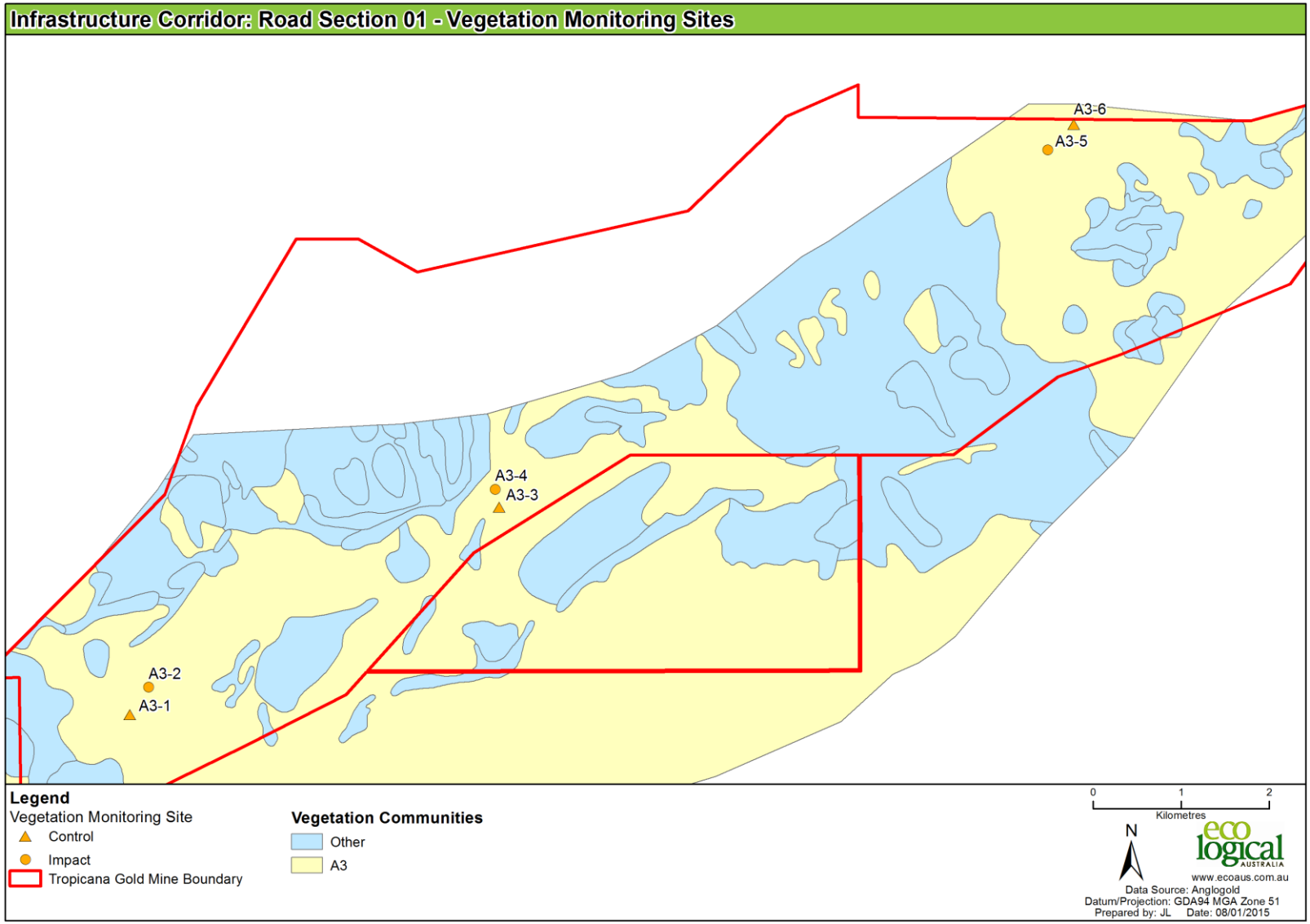
Appendix C : Quadrat location maps

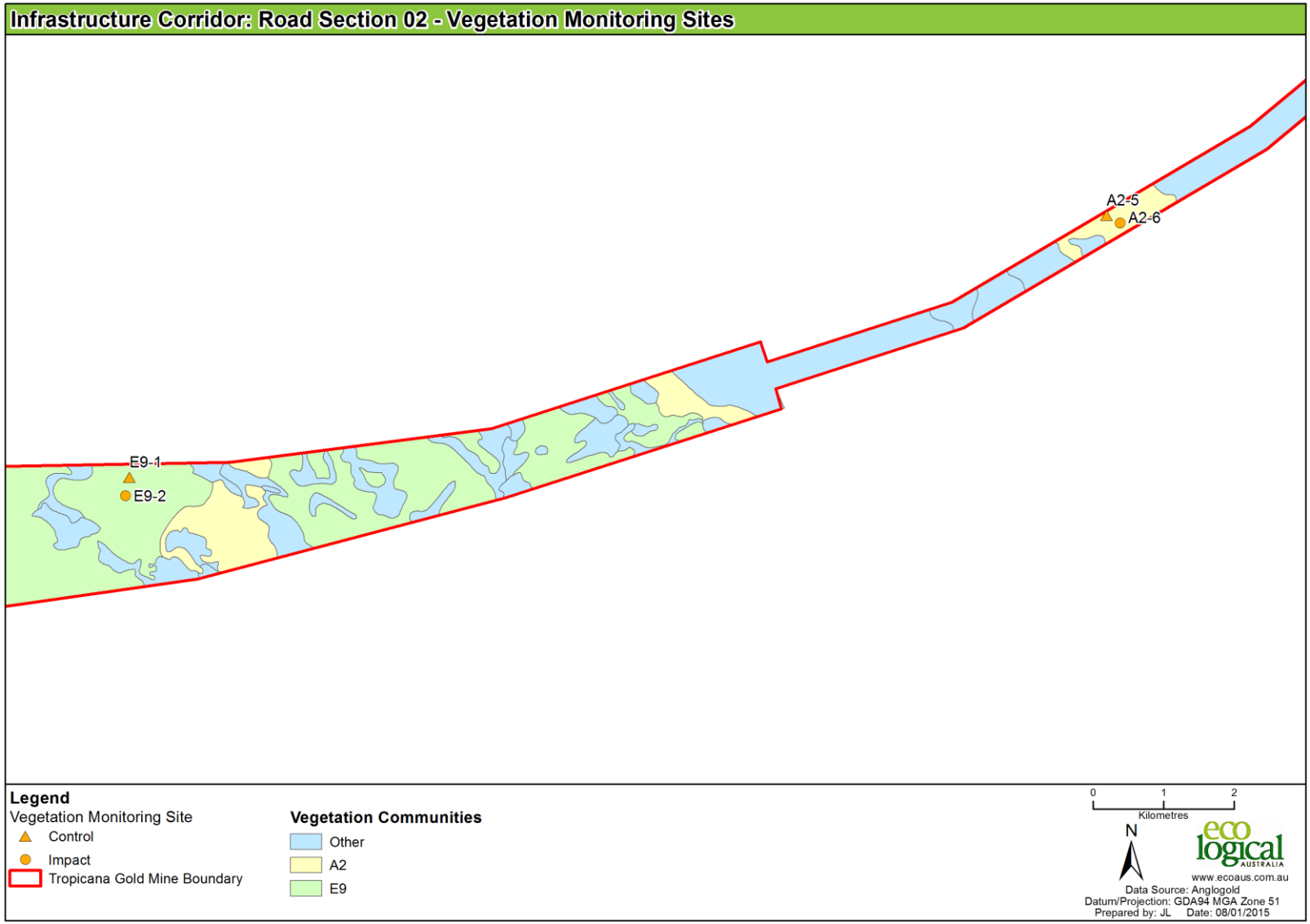


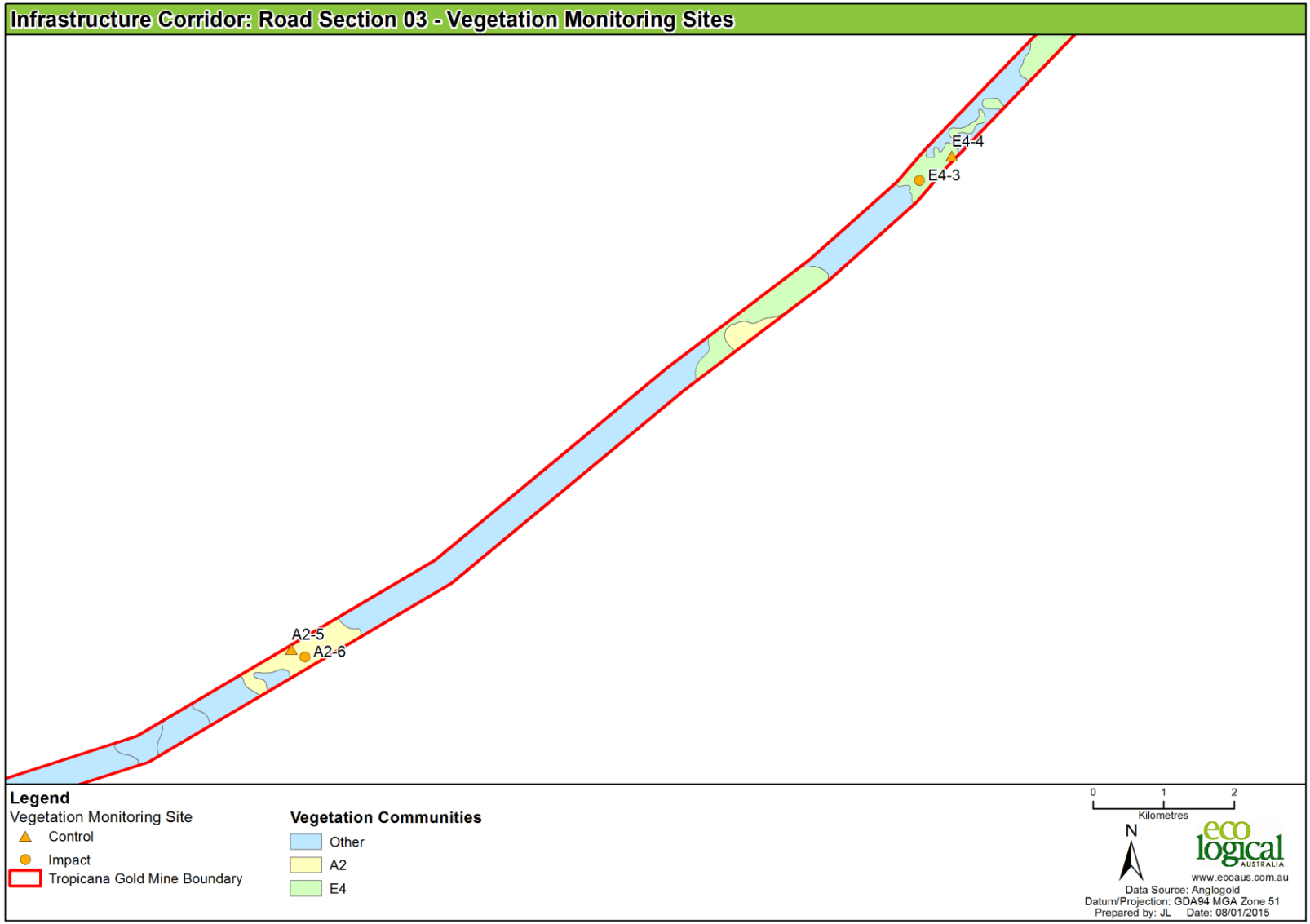


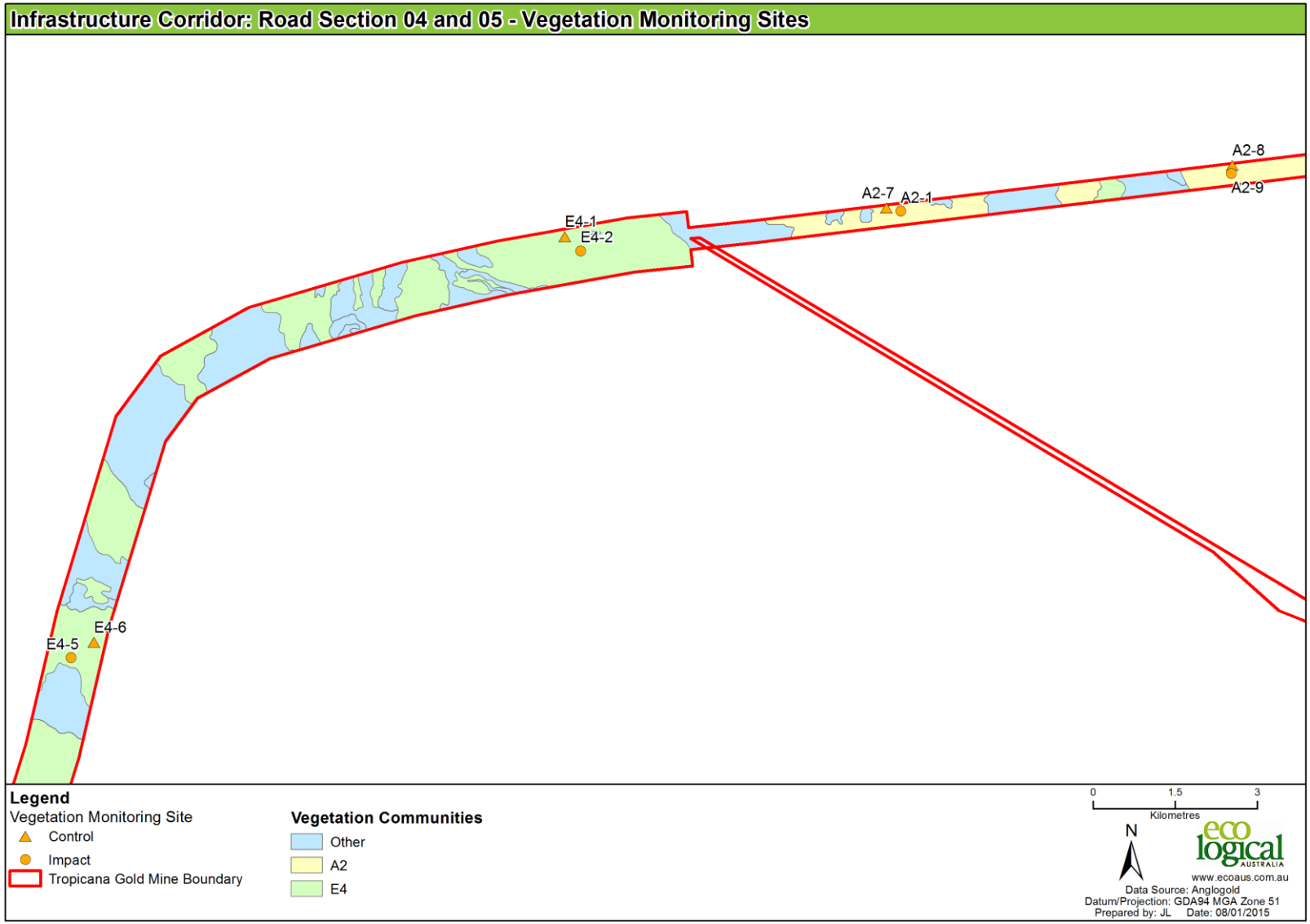


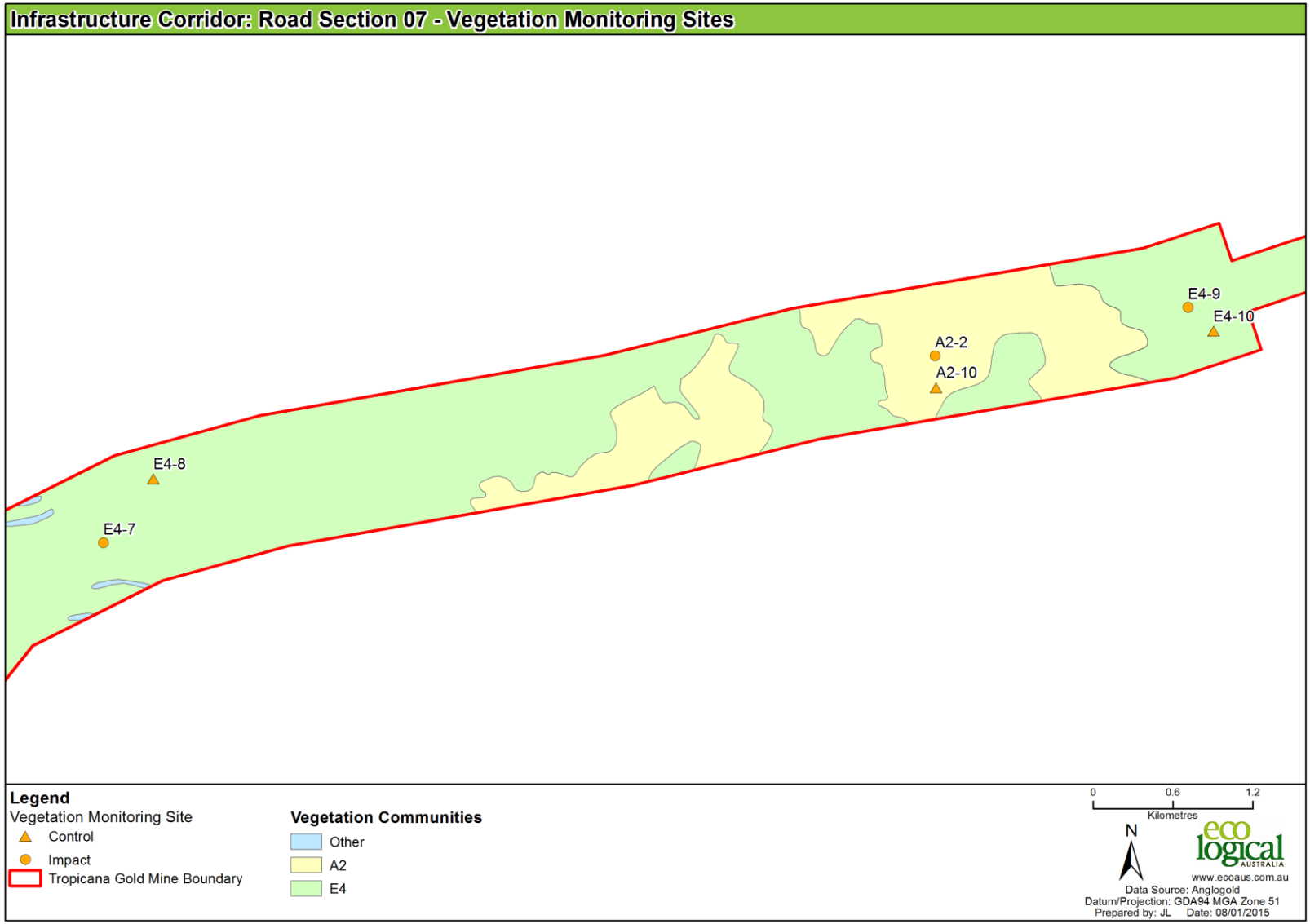


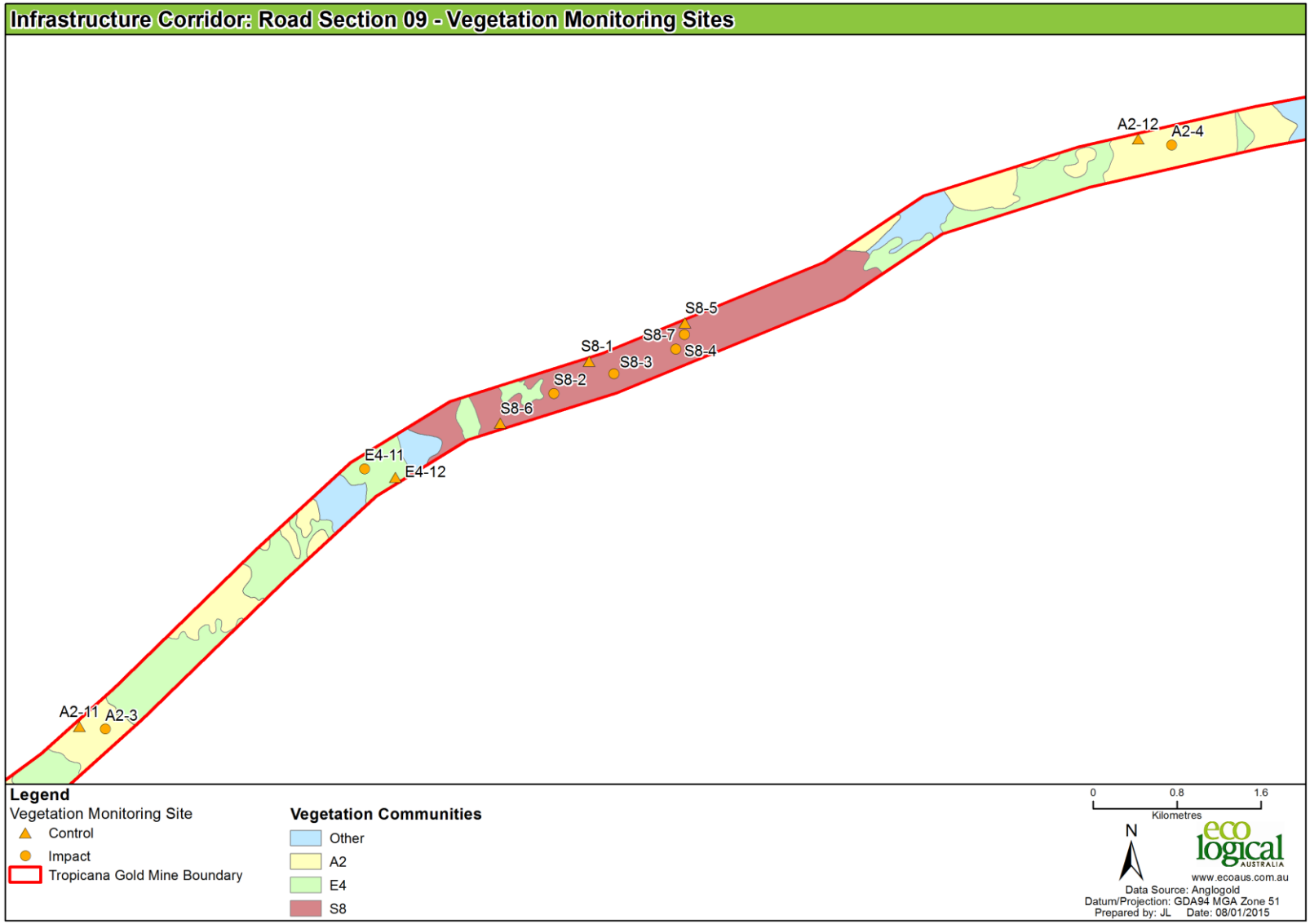


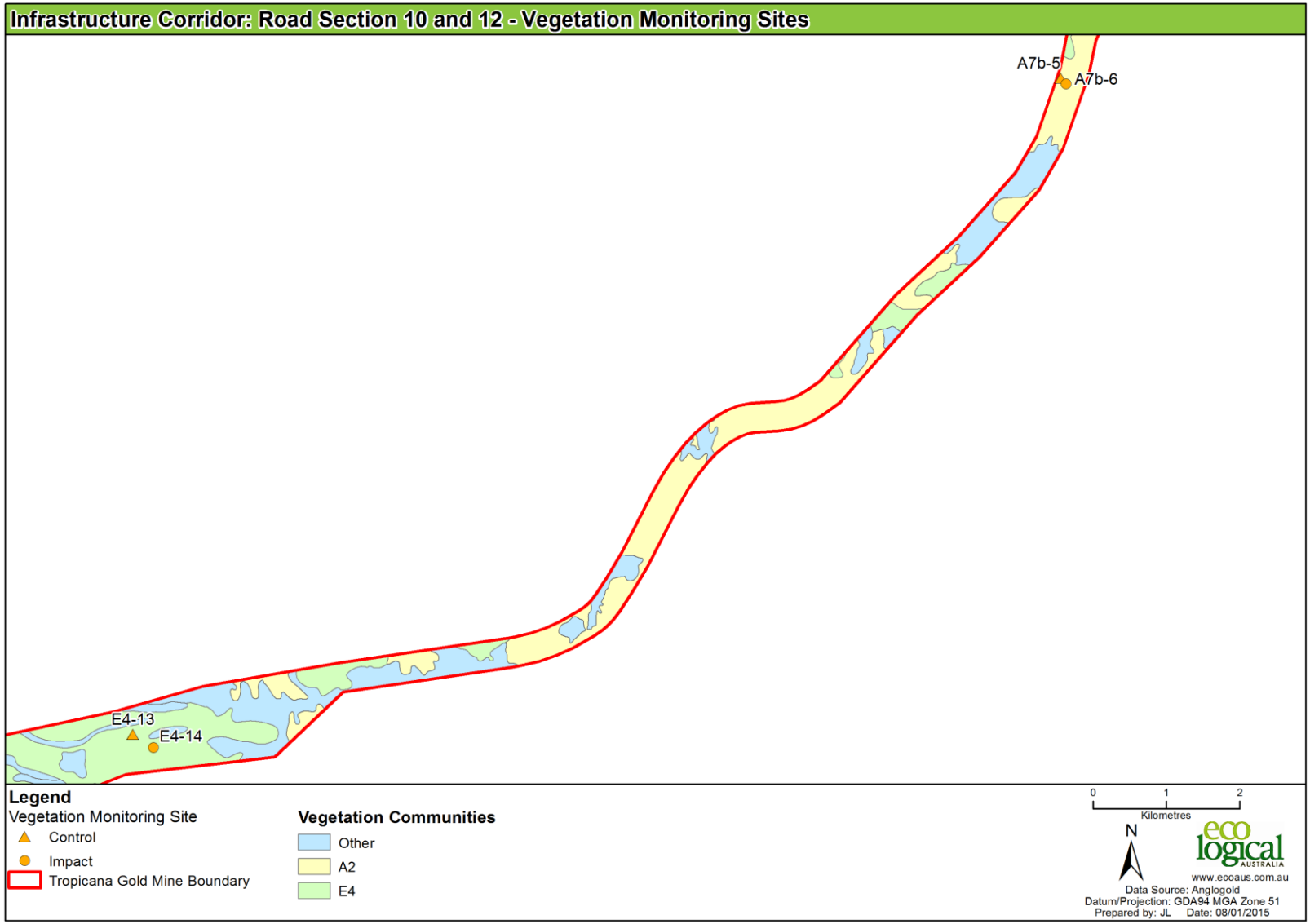


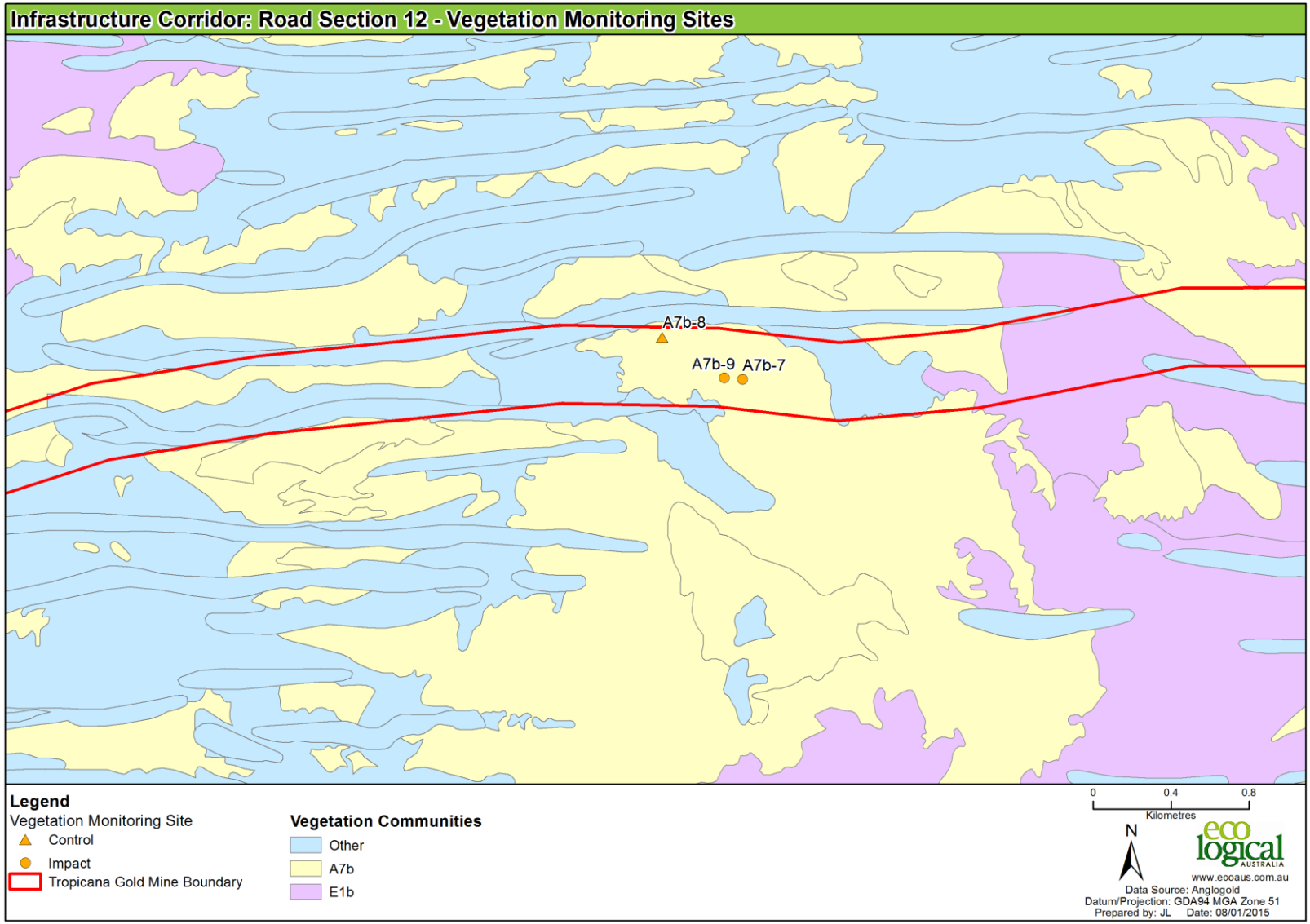


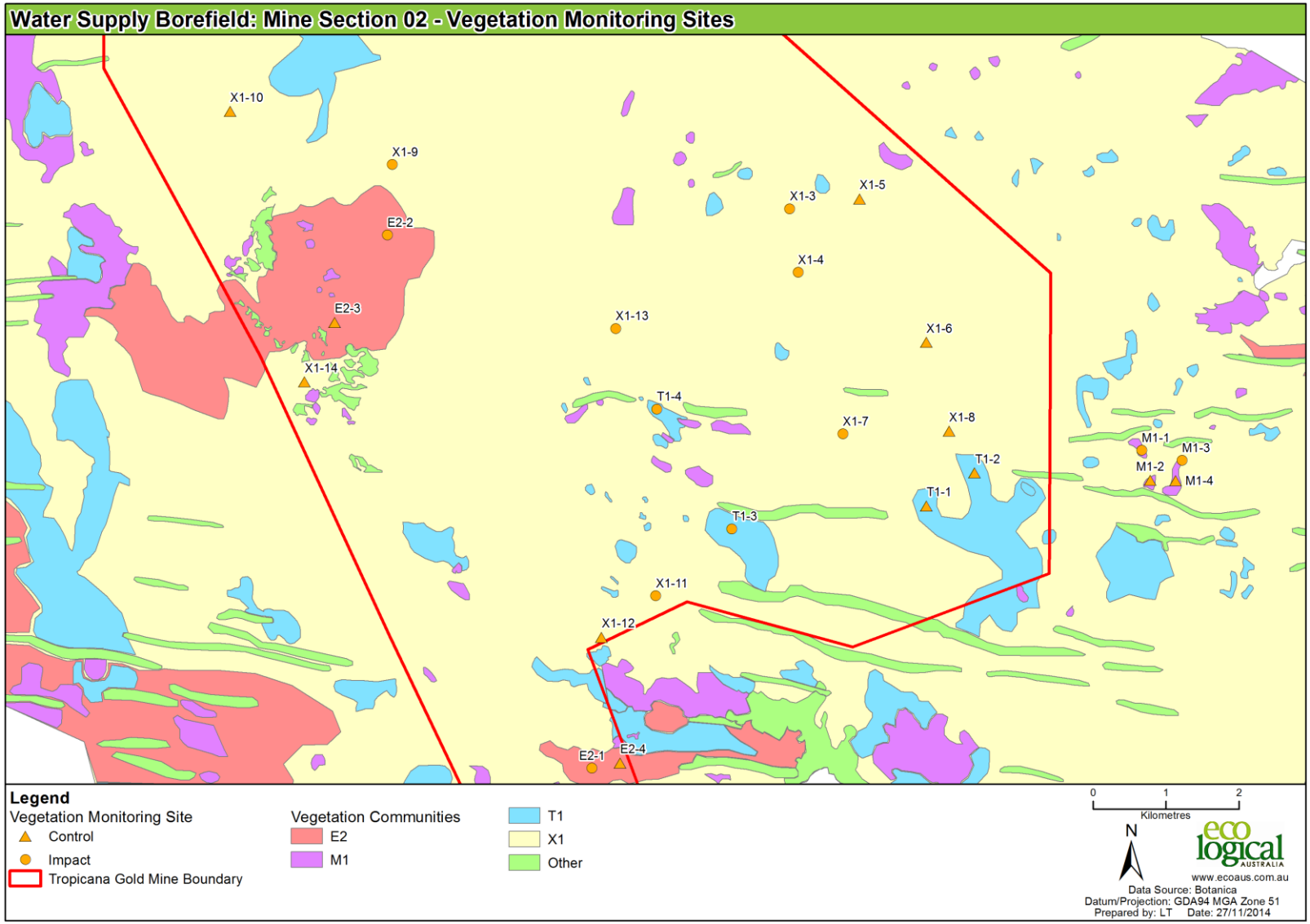

Infrastructure Corridor: Road Section 04 and 05 - Vegetation Monitoring Sites
A2-8
A2-9
A2-7
A2-1
E4-1
E4-2
E4-6
E4-5
Legend
Vegetation Monitoring Site
Control
Impact
Tropicana Gold Mine Boundary
Vegetation Communities
Other
A2
E4
0
1.5
3
Kilometres
N
eco logical AUSTRALIA
www.ecoaus.com.au
Data Source: Anglogold
Datum/Projection: GDA94 MGA Zone 51
Prepared by: JL Date: 08/01/2015

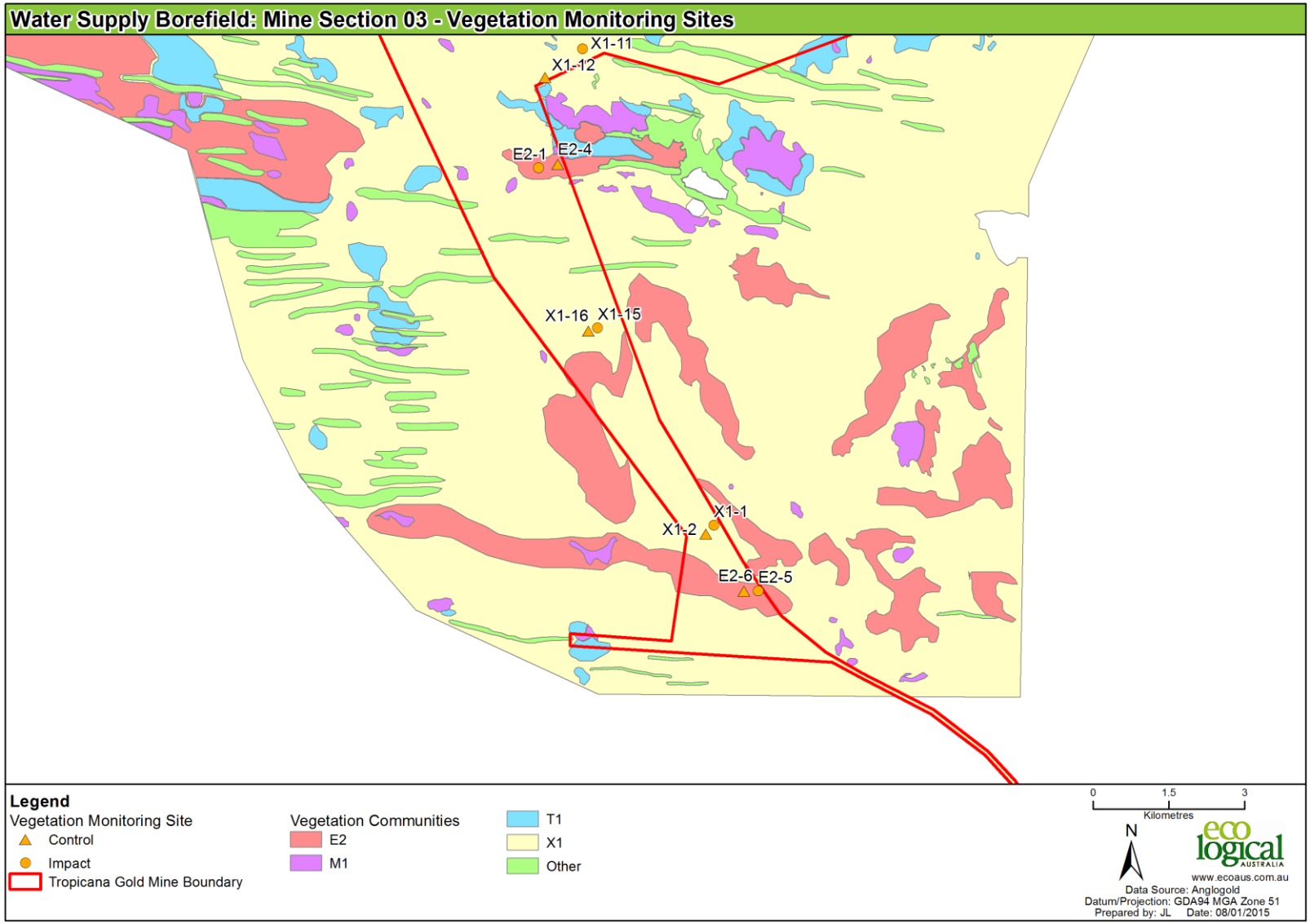












Appendix D : Remote sensing tile comparisons

Tile Number*	Comment	Area
Trop_01	No significant changes	Water Supply Borefield
Trop_02	No significant changes	Water Supply Borefield
Trop_03	Minor decrease in cover post fire	Water Supply Borefield
Trop_04	Patch - minor increase in vegetation	Water Supply Borefield
Trop_05	Minor decrease in cover post fire	Water Supply Borefield
Trop_06	Minor decrease in cover post fire Track widening associated with approved clearing	Water Supply Borefield
Trop_07	Minor decrease in cover post fire Track widening associated with approved clearing	Water Supply Borefield
Trop_08	Track widening associated with approved clearing Lower water level in dam	Water Supply Borefield
Trop_09	Track widening associated with approved clearing	Water Supply Borefield
Trop_10	No significant changes	Water Supply Borefield
Trop_11	No significant changes	Water Supply Borefield
Trop_12	Track widening associated with approved clearing	Water Supply Borefield
Trop_13	No significant changes	Water Supply Borefield
Trop_14	No significant changes	Water Supply Borefield
Trop_15	No significant changes	Water Supply Borefield
Trop_16	Lower water levels in the east Significantly lower vegetation cover in the south - Fire Damage	Water Supply Borefield
Trop_17	Lower water levels in the east Significantly lower vegetation cover in the south - Fire Damage	Water Supply Borefield
Trop_18	No significant changes	Water Supply Borefield
Trop_19	No significant changes	Operational Area
Trop_20	No significant changes	Operational Area
Trop_21	No significant changes	Operational Area
Trop_22	Clearing along track near camp associated with approved clearing	Operational Area

Tile Number*	Comment	Area
Trop_23	Clearing along track near camp associated with approved clearing	Operational Area
Trop_24	Track widening associated with approved clearing	Operational Area
Trop_25	No significant changes	Operational Area
Trop_26	No significant changes outside the mine	Operational Area
Trop_27	No significant changes outside the mine	Operational Area
Trop_28	No significant changes	Operational Area
Trop_29	No significant changes outside the mine	Operational Area
Trop_30	No significant changes outside the mine	Operational Area
Trop_31	No significant changes	Operational Area
Trop_32	New track associated with approved clearing General increase in greenness and ground cover - Recovery	Operational Area
Trop_33	No significant changes	Operational Area
Trop_34	No significant changes	Operational Area
Trop_35	New track associated with approved clearing	Operational Area
Trop_36	No significant changes	Operational Area
Trop_37	No significant changes	Operational Area
Trop_38	No significant changes	Operational Area
Trop_39	Minor increase in ground cover in the west - Fire recovery	Infrastructure Corridor
Trop_40	No significant changes	Operational Area
Trop_41	No significant changes	Operational Area
Trop_42	No significant changes	Operational Area
Trop_43	No significant changes	Operational Area
Trop_44	Minor increase in ground cover - Fire recovery	Infrastructure Corridor
Trop_45	Minor increase in ground cover - Fire recovery	Infrastructure Corridor
Trop_46	Minor increase in ground cover in the north-east - Fire recovery	Infrastructure Corridor

Tile Number*	Comment	Area
Trop_47	No significant changes	Infrastructure Corridor
Trop_48	No significant changes	Infrastructure Corridor
Trop_49	No significant changes	Infrastructure Corridor
Trop_50	No significant changes	Infrastructure Corridor
Trop_51	No significant changes	Infrastructure Corridor
Trop_52	No significant changes	Infrastructure Corridor
Trop_53	No significant changes	Infrastructure Corridor
Trop_54	No significant changes	Infrastructure Corridor
Trop_55	No significant changes	Infrastructure Corridor
Trop_56	No significant changes	Infrastructure Corridor
Trop_57	No significant changes	Infrastructure Corridor
Trop_58	No significant changes	Infrastructure Corridor
Trop_59	No significant changes	Infrastructure Corridor
Trop_60	No significant changes	Infrastructure Corridor
Trop_61	No significant changes	Infrastructure Corridor
Trop_62	No significant changes	Infrastructure Corridor
Trop_63	No significant changes	Infrastructure Corridor
Trop_64	No significant changes	Infrastructure Corridor
Trop_65	Track widening associated with approved clearing	Infrastructure Corridor
Trop_66	No significant changes	Infrastructure Corridor
Trop_67	No significant changes	Infrastructure Corridor
Trop_68	No significant changes	Infrastructure Corridor
Trop_69	No significant changes	Infrastructure Corridor
Trop_70	No significant changes	Infrastructure Corridor

Tile Number*	Comment	Area
Trop_71	No significant changes	Infrastructure Corridor
Trop_72	No significant changes	Infrastructure Corridor
Trop_73	No significant changes	Infrastructure Corridor
Trop_74	No significant changes	Infrastructure Corridor
Trop_75	No significant changes	Infrastructure Corridor
Trop_76	No significant changes	Infrastructure Corridor
Trop_77	No significant changes	Infrastructure Corridor
Trop_78	No significant changes	Infrastructure Corridor
Trop_79	No significant changes	Infrastructure Corridor
Trop_80	No significant changes	Infrastructure Corridor
Trop_81	No significant changes	Infrastructure Corridor
Trop_82	No significant changes	Infrastructure Corridor
Trop_83	Lower water levels in dam area in the north-east. Approved clearing	Infrastructure Corridor
Trop_84	No significant changes	Infrastructure Corridor
Trop_85	No significant changes	Infrastructure Corridor
Trop_86	No significant changes	Infrastructure Corridor
Trop_87	No significant changes	Water Supply Borefield
Trop_88	No significant changes	Water Supply Borefield
Trop_89	No significant changes	Water Supply Borefield
Trop_90	No significant changes	Water Supply Borefield
Trop_91	No significant changes	Water Supply Borefield
Trop_92	No significant changes	Water Supply Borefield
Trop_93	No significant changes	Water Supply Borefield
Trop_94	No significant changes	Water Supply Borefield

Tile Number*	Comment	Area
Trop_95	No significant changes	Water Supply Borefield
Trop_96	No significant changes	Water Supply Borefield
Trop_97	No significant changes	Water Supply Borefield
Trop_98	No significant changes	Water Supply Borefield
Trop_99	Track widening associated with approved clearing Fire scar in the north-west	Water Supply Borefield
Trop_100	Track widening associated with approved clearing Fire scar in the north-west	Water Supply Borefield
Trop_101	New track running north-south through centre of tile - Approved	Water Supply Borefield
Trop_102	No significant changes	Water Supply Borefield
Trop_103	No significant changes	Water Supply Borefield
Trop_104	No significant changes	Water Supply Borefield
Trop_105	No significant changes	Water Supply Borefield
Trop_106	No significant changes	Water Supply Borefield
Trop_107	No significant changes	Water Supply Borefield
Trop_108	No significant changes	Water Supply Borefield
Trop_109	No significant changes	Water Supply Borefield
Trop_110	No significant changes	Infrastructure Corridor
Trop_111	No significant changes	Infrastructure Corridor
Trop_112	No significant changes	Infrastructure Corridor
Trop_113	New cleared areas along tracks in the south. New track in the north-west - Approved	Infrastructure Corridor
Trop_114	No significant changes	Infrastructure Corridor
Trop_115	New track in the east - Approved Track widening associated with approved clearing	Infrastructure Corridor
Trop_116	Track widening on the north-eastern side	Infrastructure Corridor
Trop_117	Track widening on the north-eastern side	Infrastructure Corridor
Trop_118	No significant changes	Water Supply Borefield

Tile Number*	Comment	Area
Trop_01	No significant changes	Water Supply Borefield
Trop_02	No significant changes	Water Supply Borefield

Appendix E : Field data sheets

Plot	Photos	Cover - Bare soil	Cover - overall	Cover - over	Cover - mid	Cover - under	Foliar cond - Browning - Over	Foliar cond - Browning - Mid	Foliar cond - Browning - Under	Foliar cond - Leaf loss - Over	Foliar cond - Leaf loss - Mid	Foliar cond - Leaf loss - Under	Deposition (depth cm, area if >4m2	Erosion (Depth, Width, Length cm)	Observations
A2-1	5820	55	40	5	15	25	Green	Green	Green	5	5	5			No disturbance or dust
A2-10	1842	25	75	15	10	55	Green	Green	Green	5	5	4			The vegetation is healthy and in great condition
A2-11	1852	40	55	50	4	1	Green	Green	Green	5	5	5			No disturbance, there are a high number of annuals.
A2-12	5856	60	40	0.5	4	40	Green	Green	Green	5	5	5			No disturbance.
A2-2	1840	45	50	0	20	30	n/a	Green	Green	5	5	n/a			A large number of young Aluta. The vegetation is in great condition. There is no disturbance or unexplained deaths.
A2-3	1850	20	75	70	5	1	Green	Green	Yellow	5	5	4			No disturbance, with minimal dust present.
A2-4	5853	40	55	0	15	45	n/a	Green	Green	n/a	5	5			No disturbance, with minimal dust present.
A2-5	5803	45	55	20	30	20	Green	Green	Yellow	5	3	3			No disturbance.
A2-6	5800	40	60	35	15	15	Green	Green	Yellow	5	4	3			As with last years' survey, the *Triodia* are dying back, probably due to drought. Other species look

Plot	Photos	Cover - Bare soil	Cover - overall	Cover - over	Cover - mid	Cover - under	Foliar cond - Browning - Over	Foliar cond - Browning - Mid	Foliar cond - Browning - Under	Foliar cond - Leaf loss - Over	Foliar cond - Leaf loss - Mid	Foliar cond - Leaf loss - Under	Deposition (depth cm, area if >4m2	Erosion (Depth, Width, Length cm)	Observations
															fine, some senescence of older branches.
A2-7	5823	70	30	5	20	5	Green	Green	Green	5	5	5			No disturbance.
A2-8	1833	15	80	0	40	40	n/a	Green	Yellow	n/a	5	5			No disturbance.
A2-9	1831	40	55	0	30	25	n/a	Green	Green	n/a	5	5			No disturbance or dust.
A3-1	1796	70	40	0	30	10	n/a	Green	Yellow	n/a	5	4			Evidence of cattle grazing and rabbits, no weeds.
A3-2	1799	60	30	0	15	20	n/a	Green	Yellow	n/a	5	4			Evidence of cattle grazing and rabbits, no weeds.
A3-3	1811	65	35	20	10	10	Green	Green	Yellow	5	5	4			Evidence of cattle grazing and rabbits, three *Salvia verbenaca* weeds.
A3-4	1806	60	35	25	4	15	Green	Green	Yellow	5	5	4			Evidence of cattle grazing and rabbits, one *Salvia verbenaca* weed.
A3-5	1813	35	60	55	20	5	Green	Green	Yellow	5	5	4			Evidence of kangaroo grazing, no weeds or disturbance.
A3-6	1815	45	55	35	20	5	Green	Green	Green	5	5	5			No disturbance.

Plot	Photos	Cover - Bare soil	Cover - overall	Cover - over	Cover - mid	Cover - under	Foliar cond - Browning - Over	Foliar cond - Browning - Mid	Foliar cond - Browning - Under	Foliar cond - Leaf loss - Over	Foliar cond - Leaf loss - Mid	Foliar cond - Leaf loss - Under	Deposition (depth cm, area if >4m2	Erosion (Depth, Width, Length cm)	Observations
A7a-1	5779	70	30	5	20	5	Green	Green	Yellow	5	4	4			The NW corner tag is missing.
A7a-10	5875	50	40	25	15	0.75	Green	Green	Yellow	4	4	3			No disturbance.
A7a-2	5775	70	30	25	0	25	Green	n/a	Yellow	5	n/a	4			*Triodia* drought stressed like last year.
A7a-3	5768	75	25	15	4	20	Green	Green	yellow	4	4	4			No change since last year, old senescence
A7a-4	5877	45	55	5	20	45	Green	Green	Yellow	5	4	4			No change since last year, still a lot of camel activity, large tree branch recently fallen (hence over storey cover change) , likely was weak from previous fire and fallen in strong wind, tree otherwise healthy
A7a-5	5879	20	80	35	15	45	Green	Green	Yellow	4	4	4			No change since last year. Some *Eucalyptus* leaves show signs of insect attack, older branches senescing, *Triodia* dying back, but generally good condition.

Plot	Photos	Cover - Bare soil	Cover - overall	Cover - over	Cover - mid	Cover - under	Foliar cond - Browning - Over	Foliar cond - Browning - Mid	Foliar cond - Browning - Under	Foliar cond - Leaf loss - Over	Foliar cond - Leaf loss - Mid	Foliar cond - Leaf loss - Under	Deposition (depth cm, area if >4m2	Erosion (Depth, Width, Length cm)	Observations
A7a-6	5919	50	50	20	30	10	Green	Green	Yellow	4	4	4			No change since last year.
A7a-7	5787	70	30	15	20	10	Green	Green	Yellow	5	4	4			Same conditions as last year with no change. The plants are drought affected.
A7a-8	5783	40	60	30	30	5	Green	Green	Yellow	4	4	4			No change since last year apart from fresh fallen branch from *Acacia*, likely weakened from past fire, otherwise healthy.
A7a-9	5869	75	25	10	15	5	Green	Green	Yellow	4	4	4			No change since last year, with vegetation still drought stressed
A7b-1	1874	35	60	0	40	25	n/a	Green	Green	n/a	5	5			Healthy with no disturbance.
A7b-2	1791	40	40	35	1	15	Green	Green	Yellow	5	5	4			Healthy with no disturbance.
A7b-3	1868	60	40	20	20	3	Green	Green	Yellow	4	4	4			This vegetation is long unburnt, lower branches in older plants naturally senescing. The vegetation is in good condition. No signs of disturbance or change since last year.

Plot	Photos	Cover - Bare soil	Cover - overall	Cover - over	Cover - mid	Cover - under	Foliar cond - Browning - Over	Foliar cond - Browning - Mid	Foliar cond - Browning - Under	Foliar cond - Leaf loss - Over	Foliar cond - Leaf loss - Mid	Foliar cond - Leaf loss - Under	Deposition (depth cm, area if >4m2	Erosion (Depth, Width, Length cm)	Observations
A7b-4	1866	75	25	15	1	10	Green	Green	Yellow	5	4	4			No change since last year, very sparse annuals dying off with some lower branches senescing. The *Triodia* is dying back.
A7b-5	5844	60	40	5	10	25	Green	Green	Green	3	3	4			High recruitment following fire with many post fire successional species. No Aluta juveniles present. Overstorey has decreased due to death of tall shrubs from fire.
A7b-6	5836	50	50	15	15	20	Yellow	Green	Green	3	4	4			No change from last year. Fire has killed off some large *Acacias* and *Eucalyptus* causing leaves to fall off which has subsequently influenced ground cover, leaf scale and browning scale. The vegetation is healthy and regenerating well after the fire.
A7b-7	5826	80	20	0	0	20	n/a	n/a	Green	n/a	n/a	4			No change since last year with great diversity, some shrubs have died, possibly drought or died

Plot	Photos	Cover - Bare soil	Cover - overall	Cover - over	Cover - mid	Cover - under	Foliar cond - Browning - Over	Foliar cond - Browning - Mid	Foliar cond - Browning - Under	Foliar cond - Leaf loss - Over	Foliar cond - Leaf loss - Mid	Foliar cond - Leaf loss - Under	Deposition (depth cm, area if >4m2	Erosion (Depth, Width, Length cm)	Observations
															naturally only a handful of shrubs like this, all others excellent health.
A7b-8	5833	40	60	55	15	2	Green	Green	Yellow	4	4	3			No change since last year, still senescence of lower branches in older plants, sparse annuals drying off.
A7b-9	5829	50	50	10	40	5	Green	Green	Yellow	4	4	3			No change since last year, still senescence of older branches, sparse annuals drying off, plants otherwise in good condition.
C9-1	5766	65	35	10	30	1	Green	yellow	yellow	5	4	4			Vehicle track from north east to south has crushed some shrubs. Very sparse ground layer.
C9-2	5763	35	65	10	45	10	Green	Green	Yellow	4	4	4			Healthy with no disturbance.
C9-3	5760	55	45	4	30	30	Green	Green	Yellow	4	4	3			As per last year some chenopods stressed and some have died but others healthy, possibly senescence a cause, all other plants healthy.

Plot	Photos	Cover - Bare soil	Cover - overall	Cover - over	Cover - mid	Cover - under	Foliar cond - Browning - Over	Foliar cond - Browning - Mid	Foliar cond - Browning - Under	Foliar cond - Leaf loss - Over	Foliar cond - Leaf loss - Mid	Foliar cond - Leaf loss - Under	Deposition (depth cm, area if >4m2	Erosion (Depth, Width, Length cm)	Observations
C9-4	5758	70	30	1	30	0.5	green	yellow	brown	4	3	3			Drought experienced, same as last year, no annuals and grasses died off.
E1b-1	5921	30	70	0	55	60	n/a	Green	Yellow	n/a	5	4			Minimal signs of dust, vegetation is healthy.
E1b-10	1870	40	60	5	15	40	Green	Green	Yellow	5	5	4			No change since last year, *Triodia* dying off a bit, senescence or drought, all other plants very healthy. Some old dead shrubs from fire. There are a few annuals.
E1b-2	5923	60	40	0	15	30	n/a	Green	Green	n/a	5	5			No disturbance.
E1b-3	1774	25	75	5	20	60	Green	Green	Yellow	5	5	4			No dust.
E1b-4	1768	60	35	10	15	25	Green	Green	Yellow	5	5	5			No dust.
E1b-5	1780	35	60	5	30	35	Green	Yellow	Yellow	5	5	4			Galls, no dust, kangaroo grazing
E1b-6	1778	20	70	10	40	30	Green	Yellow	Yellow	5	5	4			Galls, no dust, kangaroo grazing
E1b-7	1876	45	50	30	25	1	Green	Green	Yellow	5	5	4			No disturbance, good seed base.
E1b-8	1786	40	40	15	25	5	Green	Green	Green	5	5	5			No disturbance.

Plot	Photos	Cover - Bare soil	Cover - overall	Cover - over	Cover - mid	Cover - under	Foliar cond - Browning - Over	Foliar cond - Browning - Mid	Foliar cond - Browning - Under	Foliar cond - Leaf loss - Over	Foliar cond - Leaf loss - Mid	Foliar cond - Leaf loss - Under	Deposition (depth cm, area if >4m2	Erosion (Depth, Width, Length cm)	Observations
E1b-9	1872	60	40	5	30	5	Green	Green	Yellow	5	5	4			Some dead shrubs from an old fire. The vegetation is healthy, very few annuals.
E2-1	1898	70	30	0	25	5	n/a	Green	Green	n/a	5	5			No new disturbance.
E2-2	1929	45	50	15	25	20	Green	Green	Yellow	5	5	4			No disturbance.
E2-3	1927	70	30	10	2	25	Green	Green	Green	5	5	5			No disturbance.
E2-4	1903	65	35	0	20	15	n/a	Green	Green	n/a	5	5			No disturbance.
E2-5	1884	75	25	0	15	20	n/a	Green	Yellow	n/a	5	5			Burnt approximately 2 years ago, recovering well but as with site E2-6 some fire successional species such as *Codonocarpus cotinifolius* are dying out, some *Triodia* yellowing likely drought.
E2-6	1882	85	20	2	15	5	Green	Green	Yellow	5	5	4			Burnt about 2 years ago recovering well, some post fire successional species are dying or have died (e.g. *Codonocarpus cotinifolius*) , a Eucalypt has moved into overstorey, Triodia a bit yellow

Plot	Photos	Cover - Bare soil	Cover - overall	Cover - over	Cover - mid	Cover - under	Foliar cond - Browning - Over	Foliar cond - Browning - Mid	Foliar cond - Browning - Under	Foliar cond - Leaf loss - Over	Foliar cond - Leaf loss - Mid	Foliar cond - Leaf loss - Under	Deposition (depth cm, area if >4m2	Erosion (Depth, Width, Length cm)	Observations
															which is typical for this species, no other disturbance.
E3-1	1878	50	45	10	1	45	Green	Yellow	Yellow	5	5	4			No disturbance.
E3-2	1880	30	70	3	5	65	Green	Green	Green	5	5	5			No disturbance.
E3-3	1772	40	40	5	35	5	n/a	Green	Yellow	n/a	5	4			New growth, flowering, kangaroo track.
E3-4	1770	45	45	5	25	15	Green	Green	Yellow	5	5	4			Healthy with no dust.
E3-5	1776	60	40	5	20	15	Green	Green	Yellow	5	5	4			No dust, some annuals.
E3-6	1782	25	70	2	1	70	Green	Green	Green	5	5	4			*Triodia* seeding well.
E4-1	1830	60	35	1	30	5	Green	Green	Yellow	5	5	5			No disturbance.
E4-10	1848	30	70	5	30	45	Green	Green	Yellow	5	5	5			No disturbance.
E4-11	1853	65	35	1	5	30	Green	Green	Green	5	5	5			No disturbance.
E4-12	1856	65	35	0	5	30	n/a	Green	Green	n/a	5	5			No disturbance.
E4-13	5850	25	75	5	5	70	Green	Green	Yellow	5	5	3			Little change since last year, some low shrubs moved to the mid storey, *Triodia* dying back still, but natural senescence, generally vegetation in good health.

Plot	Photos	Cover - Bare soil	Cover - overall	Cover - over	Cover - mid	Cover - under	Foliar cond - Browning - Over	Foliar cond - Browning - Mid	Foliar cond - Browning - Under	Foliar cond - Leaf loss - Over	Foliar cond - Leaf loss - Mid	Foliar cond - Leaf loss - Under	Deposition (depth cm, area if >4m2	Erosion (Depth, Width, Length cm)	Observations
E4-14	5848	40	60	20	20	50	Green	Green	Yellow	5	4	4			No change since last year overall, *Triodia* around base of Eucalypts have died possibly from shading or altered surface water as other *Triodia* in quadrat in good health generally except for typical senescence of leaves at centre of clump. Shrubs and *Eucalyptus* also healthy, just some senescence of older branches.
E4-2	1829	35	50	4	40	10	Green	Green	Green	5	5	5			No disturbance.
E4-3	5808	55	45	20	10	20	Green	Green	Yellow	5	5	4			No disturbance.
E4-4	5811	60	40	25	15	25	Green	Green	Yellow	5	5	4			*Leptosema* dying off due to natural senescence, other plants seem healthy, *Triodia* a bit drought stressed.
E4-5	5814	25	75	25	10	60	Green	Green	Yellow	5	5	4			No obvious impact, *Triodia* drought stressed/senescing, some shrubs from ground layer have moved into mid storey.

Plot	Photos	Cover - Bare soil	Cover - overall	Cover - over	Cover - mid	Cover - under	Foliar cond - Browning - Over	Foliar cond - Browning - Mid	Foliar cond - Browning - Under	Foliar cond - Leaf loss - Over	Foliar cond - Leaf loss - Mid	Foliar cond - Leaf loss - Under	Deposition (depth cm, area if >4m2	Erosion (Depth, Width, Length cm)	Observations
E4-6	5817	40	60	20	5	50	Green	Green	Yellow	5	5	4			*Triodia* senescing or drought stressed. Otherwise plants healthy no new disturbance. Some shrubs moved into mid layer.
E4-7	1835	60	40	5	5	35	Green	Green	Green	5	5	4			Some low shrubs moved into mid storey, veg health good, no signs of stress or disturbance, cover includes leaf litter.
E4-8	1837	60	40	0	10	35	n/a	Green	Yellow	n/a	5	4			Healthy vegetation, some shrubs drought stressed or senescing, particularly *Leptosema*, but overall most species in good condition.
E4-9	1844	40	60	10	20	50	Green	Green	Yellow	5	5	3			Several *Triodia* deaths and others senescing. Does not appear to be any unnatural erosion or deposition. Other plants in good condition not showing signs of stress.
E9-1	5797	65	45	3	30	5	Green	Green	Yellow	4	4	3			Little change since last year, very few annuals mostly drying off, some *Mulga* and *Ptilotus* leaves stripped

Plot	Photos	Cover - Bare soil	Cover - overall	Cover - over	Cover - mid	Cover - under	Foliar cond - Browning - Over	Foliar cond - Browning - Mid	Foliar cond - Browning - Under	Foliar cond - Leaf loss - Over	Foliar cond - Leaf loss - Mid	Foliar cond - Leaf loss - Under	Deposition (depth cm, area if >4m2	Erosion (Depth, Width, Length cm)	Observations
															looks like from camels, a lot of camel tracks throughout.
E9-2	5791	50	50	10	30	2	Green	Green	Green	4	5	4			Little change since last year, very few annuals, many already finished, some lower leaves in overstorey fallen due to senescence plants otherwise seem healthy.
E9-5	1827	35	60	20	15	40	Green	Green	Green	5	5	4			No disturbance.
E9-6	1824	60	40	15	15	20	Green	Green	Green	5	5	4			No dust.
M1-1	5897	50	50	0	0	50	n/a	n/a	Yellow	n/a	n/a	1			Regenerating fine following fire however little Acacia and other large shrub recruitment, vegetation also drought stressed and many grasses have died.
M1-2	5895	75	25	0	2	25	n/a	Brown	Yellow	n/a	2	4			Regenerating well after fire, though slightly drought stressed, *Codonocarpus cotinifolius* which makes up mid storey layer has died, due to reaching end of its lifespan.

Plot	Photos	Cover - Bare soil	Cover - overall	Cover - over	Cover - mid	Cover - under	Foliar cond - Browning - Over	Foliar cond - Browning - Mid	Foliar cond - Browning - Under	Foliar cond - Leaf loss - Over	Foliar cond - Leaf loss - Mid	Foliar cond - Leaf loss - Under	Deposition (depth cm, area if >4m2	Erosion (Depth, Width, Length cm)	Observations
M1-3	5891	50	50	0	0	50	n/a	n/a	Yellow	n/a	n/a	4			Little change since last year, grasses drying off, and vegetation slightly drought stressed, but otherwise seems to be healthy and recruiting well following fire. *Acacia* however have few recruits.
M1-4	5888	40	60	0	3	60	n/a	Yellow	Yellow	n/a	2	4			Regenerating well after fire, understory shrubs healthy and increasing in cover, mid storey comprises all C*odonocarpus cotinifolius*, a post fire successional species, which is at the end of its lifespan. Of note also, there is little *Acacia* recruitment evident.
S8-1	1862	65	35	0	0	35	n/a	n/a	Green	n/a	n/a	5			No disturbance.
S8-2	1860	65	35	0	5	30	n/a	Green	Green	n/a	5	5			No disturbance.
S8-3	1864	65	35	0	3	35	n/a	Green	Green	n/a	5	5			No disturbance.
S8-4	5865	60	40	0	10	60	n/a	Green	Green	n/a	5	5			The vegetation is recovering okay.

Plot	Photos	Cover - Bare soil	Cover - overall	Cover - over	Cover - mid	Cover - under	Foliar cond - Browning - Over	Foliar cond - Browning - Mid	Foliar cond - Browning - Under	Foliar cond - Leaf loss - Over	Foliar cond - Leaf loss - Mid	Foliar cond - Leaf loss - Under	Deposition (depth cm, area if >4m2	Erosion (Depth, Width, Length cm)	Observations
S8-5	5858	65	35	0	5	30	n/a	Green	Green	n/a	5	5			No disturbance.
S8-6	1857	60	40	0	0	40	n/a	n/a	Green	n/a	n/a	5			No disturbance.
S8-7	5861	70	30	0	2	30	n/a	Green	Green	n/a	5	5			Vegetation is in okay condition.
T1-1	5899	40	60	0	2	60	n/a	Green	Yellow	n/a	5	4			Regenerating well after fire, large shrubs have recruitment. Understorey species drought stressed, some grasses drying off, but in general vegetation is healthy.
T1-2	5901	55	45	0	5	40	n/a	Green	Yellow	n/a	5	4			Regenerating well after fire, large shrubs including Acacias have recruitment. Some drought stress and drying of grasses in understorey, otherwise no change since last year.
T1-3	1910	60	40	0	5	35	n/a	Green	Green	n/a	5	5			No disturbance.
T1-4	1913	50	45	0	5	40	n/a	Green	Yellow	n/a	5	4			No disturbance.

Plot	Photos	Cover - Bare soil	Cover - overall	Cover - over	Cover - mid	Cover - under	Foliar cond - Browning - Over	Foliar cond - Browning - Mid	Foliar cond - Browning - Under	Foliar cond - Leaf loss - Over	Foliar cond - Leaf loss - Mid	Foliar cond - Leaf loss - Under	Deposition (depth cm, area if >4m2	Erosion (Depth, Width, Length cm)	Observations
X1-1	1887	75	25	5	25	5	Green	Green	Yellow	5	4	4			Burnt about 2 years ago, regenerating well though some post fire successional species are dying as at end of their lifecycle, *Triodia* also yellowing likely due to drought, this has influenced the leaf loss and browning, vegetation otherwise is healthy.
X1-10	1934	45	65	0	30	45	n/a	Green	Yellow	n/a	5	5			No disturbance.
X1-11	1908	65	35	0	35	4	n/a	Green	Green	n/a	5	5			No disturbance.
X1-12	1905	60	40	0	5	35	n/a	Green	Green	n/a	5	5			No disturbance.
X1-13	1915	70	30	0	5	25	n/a	Green	Green	n/a	5	5			No disturbance.
X1-14	1925	60	40	0	2	40	n/a	Green	Green	n/a	5	5			No disturbance.
X1-15	1893	75	25	0	20	5	n/a	Green	Yellow	n/a	5	4			No disturbance.
X1-16	1894	80	20	0	15	5	n/a	Green	Yellow	n/a	5	5			No disturbance.
X1-2	1891	90	10	3	10	5	Green	Green	Yellow	5	4	4			Burnt about 2 years ago, regenerating well, some post fire successional species are dying off (natural end of life cycle)

Plot	Photos	Cover - Bare soil	Cover - overall	Cover - over	Cover - mid	Cover - under	Foliar cond - Browning - Over	Foliar cond - Browning - Mid	Foliar cond - Browning - Under	Foliar cond - Leaf loss - Over	Foliar cond - Leaf loss - Mid	Foliar cond - Leaf loss - Under	Deposition (depth cm, area if >4m2	Erosion (Depth, Width, Length cm)	Observations
															subsequently reducing leaf loss, *Triodia* yellowing likely from drought, otherwise vegetation healthy.
X1-3	5915	55	45	0	5	40	n/a	Green	Yellow	n/a	5	4			Upper and middle storey species recruits are healthy. Understorey species seem drought stressed with some scattered individuals dying off, particularly grasses.
X1-4	5909	65	40	0	5	35	n/a	Green	Yellow	n/a	5	4			No new disturbance.
X1-5	5917	45	55	0	25	30	n/a	Green	Yellow	n/a	5	4			Little change since last year, understorey seems a bit drought stressed and annual grasses drying off, otherwise vegetation healthy and regenerating well after fire with shrubs and trees recruiting well
X1-6	5907	30	70	0	25	50	n/a	Green	Yellow	n/a	5	4			No change since last year, old *Triodia* senescing at centre of clump which is natural occurrence.
X1-7	5905	75	25	0	5	20	Green	Green	Green	5	4	4			No new disturbance.

Plot	Photos	Cover - Bare soil	Cover - overall	Cover - over	Cover - mid	Cover - under	Foliar cond - Browning - Over	Foliar cond - Browning - Mid	Foliar cond - Browning - Under	Foliar cond - Leaf loss - Over	Foliar cond - Leaf loss - Mid	Foliar cond - Leaf loss - Under	Deposition (depth cm, area if >4m2	Erosion (Depth, Width, Length cm)	Observations
X1-8	5903	70	30	0	10	20	n/a	Green	Yellow	n/a	5	4			Still regenerating well after fire, midstorey shrubs and over storey species have recruited. Understorey species, particularly grasses are drought stressed or drying off which has influenced browning score. Overall vegetation healthy.
X1-9	1931	70	30	0	3	30	n/a	Green	Green	n/a	5	5			No new disturbance.

Appendix F : Raw foliar cover data for Operations Area

Site name	Cover (%)																								Bare soil (%)						Site type^	Vegetation community
	Overall						Overstorey						Midstorey						Understorey													
	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016		
A7A-1	25	20	20	20	25	30	3	2	2	2	3	5	20	20	20	20	20	20	10	5	2	3	2	5	85	80	80	80	75	70	I	A7A
A7A-4	30	60	60	50	55	55	6	5	5	5	10	5	8	10	10	10	20	20	30	50	55	45	45	45	65	30	30	35	45	45	R	
A7A-2	35	55	55	40	30	30	25	20	20	35	25	25	n/a	5	2	n/a	n/a	0	20	30	65	20	25	25	70	50	65	60	70	70	I	
A7A-3	20	35	35	35	20	25	15	10	10	15	15	15	2	2	2	2	5	4	10	20	25	20	20	20	80	40	40	55	80	75	R	
A7A-5	45	75	70	70	65	80	25	25	30	35	35	35	7	10	10	15	15	15	25	30	30	35	40	45	50	20	25	20	35	20	I	
A7A-6	20	40	40	40	50	50	8	10	10	20	20	20	15	25	25	25	30	30	5	15	15	10	10	10	85	40	55	55	50	50	R	
A7A-8	40	50	50	50	60	60	17	30	30	30	30	30	15	25	25	30	25	30	30	20	10	8	5	5	60	45	45	40	40	70	I	
A7A-7	55	45	45	45	30	30	20	10	20	20	15	15	10	25	20	20	20	20	30	10	15	15	10	10	70	40	45	45	70	70	R	
A7A-10	20	35	30	30	40	40	15	15	20	20	25	25	5	10	10	10	15	15	2	2	1	1	1	0.75	90	85	80	80	50	50	I	
A7A-9	15	20	20	23	25	25	7	2	10	10	10	10	5	10	5	5	10	15	10	10	15	10	5	5	90	85	85	85	75	75	R	
E3-1	30	40	45	45	45	45	7	17	17	15	10	10	3	4	3	2	1	1	25	40	45	45	45	45	70	50	45	45	50	50	I	E3
E3-2	35	80	75	75	70	70	4	2	2	2	2	3	5	4	5	5	5	5	30	75	70	70	65	65	60	25	25	25	30	30	R	
E3-3	35	40	40	40	40	40	n/a	n/a	n/a	n/a	n/a	5	30	35	35	35	35	35	20	5	5	5	5	5	65	35	35	35	40	40	I	
E3-4	40	45	46	40	45	45	20	6	6	6	5	5	25	25	25	25	25	25	10	15	15	15	15	15	70	30	35	35	55	45	R	
E3-5	25	50	40	40	40	40	5	3	3	3	5	5	20	20	20	20	20	20	10	15	15	15	15	15	80	60	60	60	60	60	I	
E3-6	35	75	75	70	70	70	4	3	3	2	1	2	5	2	2	2	1	1	35	70	70	70	70	70	70	25	25	25	25	25	R	
E1B-1	75	70	70	70	70	70	n/a	n/a	n/a	n/a	n/a	0	60	50	50	50	55	55	60	50	45	45	60	60	55	40	40	30	30	30	I	E1
E1B-2	20	35	30	30	40	40	n/a	n/a	n/a	n/a	n/a	n/a	5	20	15	15	15	15	15	25	20	20	30	30	85	55	60	60	60	60	R	
E1B-3	45	70	74	75	75	75	10	7	7	8	5	5	10	5	10	12	15	20	30	60	60	60	60	60	60	30	30	30	25	25	I	
E1B-4	25	35	35	35	35	35	20	10	10	10	10	10	6	15	15	15	15	15	20	25	25	25	25	25	85	45	45	45	60	60	R	

Site name	Cover (%)																								Bare soil (%)						Site type^	Vegetation community
	Overall						Overstorey						Midstorey						Understorey													
	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016		
E1B-5	65	70	50	50	60	60	15	5	5	5	5	5	15	10	10	15	25	30	15	35	35	35	35	35	30	40	40	40	35	55	I	
E1B-6	50	65	70	70	70	70	10	5	5	10	10	10	30	20	25	40	40	40	10	50	50	30	30	30	50	25	20	20	20	55	R	
E1B-8	25	45	35	35	40	40	15	10	10	10	15	15	15	20	20	22	25	25	15	5	5	5	5	5	75	35	35	35	35	40	I	
E1B-7	35	50	50	50	50	50	25	30	30	30	30	30	20	25	25	25	25	25	5	5	2	1	1	1	70	35	40	40	45	45	R	
E1B-10	30	55	54	55	55	60	5	2	2	2	2	5	7	15	15	15	15	15	25	40	40	40	40	40	70	45	45	45	45	40	I	
E1B-9	20	30	30	30	35	40	4	2	2	2	4	5	20	20	20	25	30	30	5	10	8	5	3	5	85	60	60	60	60	60	R	
A7B-2	35	40	40	40	40	40	20	35	35	35	35	35	10	1	1	1	1	1	15	15	15	15	15	15	70	25	25	25	35	40	I	
A7B-1	35	60	55	55	55	60	n/a	n/a	n/a	n/a	n/a	0	30	30	30	35	35	40	30	30	25	25	25	25	55	30	30	30	30	35	R	A7B
A7B-4	25	25	25	25	25	25	15	15	15	15	15	15	15	1	1	1	1	1	5	12	12	12	10	10	80	80	80	80	80	75	I	
A7B-3	35	45	35	35	35	40	25	25	25	25	20	20	20	15	15	15	20	20	10	2	2	2	2	3	70	60	60	60	60	60	R	
C9-1	30	35	35	35	30	35	15	8	8	8	10	40	20	30	30	30	25	30	5	2	2	1	2	1	85	60	65	75	70	65	I	
C9-3	35	65	65	65	40	45	25	30	30	35	30	30	25	30	30	30	25	30	5	15	15	10	5	5	65	30	35	30	60	55	R	
C9-2	30	60	60	60	60	65	7	15	15	15	15	10	25	30	30	40	45	45	15	10	15	15	10	10	85	35	40	30	40	35	I	C9
C9-4	20	35	30	30	30	30	7	3	3	1	1	1	20	15	30	30	30	30	5	20	3	2	0.5	0.5	80	60	70	70	70	70	R	

^ I = Impact site, R = Reference site

Appendix G : Raw foliar condition data for Operations Area

Site name	Browning scale*																		Leaf loss**																Site type^	Vegetation community
	Overstorey						Midstorey						Understorey						Overstorey						Midstorey						Understorey							
	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016		
A7A-1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	3	2	5	4	5	5	5	5	5	3	5	5	4	4	5	3	3	3	3	4	I	A7a
A7A-4	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	3	1	2	5	4	5	5	5	5	5	4	5	5	4	4	4	3	3	2	4	4	R	
A7A-2	1	1	1	1	1	1	1	1	1	n/a	n/a	n/a	1	2	2	2	2	2	5	5	5	5	5	5	5	4	4	n/a	n/a	n/a	5	3	3	3	3	4	I	
A7A-3	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	5	4	4	5	4	4	5	5	5	5	4	4	5	3	3	4	4	4	R	
A7A-5	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1	2	5	4	4	5	5	4	5	4	4	5	4	4	4	3	3	4	4	4	I	
A7A-6	1	1	1	1	1	1	1	2	1	1	1	1	1	2	2	2	2	2	5	4	4	5	4	4	5	3	4	5	4	4	4	3	3	3	4	4	R	
A7A-8	1	1	1	1	1	1	1	2	1	1	1	1	1	2	2	2	2	2	5	3	3	5	3	4	5	3	4	5	4	4	5	4	3	4	4	4	I	
A7A-7	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	5	4	4	4	4	5	5	4	5	4	4	4	5	3	3	3	4	4	R	
A7A-10	1	1	1	1	1	1	1	1	1	2	1	1	1	1	2	2	1	2	5	5	4	4	4	4	5	4	5	4	4	4	5	3	3	4	4	3	I	
A7A-9	1	1	1	1	1	1	1	1	1	1	2	1	1	2	2	3	2	2	4	3	4	4	4	4	4	3	4	5	4	4	4	3	3	3	3	4	R	
E3-1	1	1	1	1	1	1	1	1	1	1	2	2	1	2	2	1	2	2	5	4	5	5	5	5	5	4	4	4	3	5	4	3	3	4	4	4	I	E3
E3-2	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1	1	5	4	5	5	5	5	5	4	5	5	5	5	5	4	4	4	5	5	R	
E3-3	1	n/a	n/a	n/a	n/a	n/a	1	2	1	1	1	1	1	2	1	1	2	2	5	n/a	n/a	n/a	n/a	n/a	5	3	4	4	5	5	5	4	4	5	4	4	I	
E3-4	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	2	5	4	4	4	5	5	5	4	5	4	4	5	4	3	5	4	4	4	R	
E3-5	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	5	5	5	5	5	5	5	4	5	5	5	5	5	3	3	3	4	4	I	
E3-6	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1	1	5	5	5	5	5	5	5	5	5	5	5	5	5	4	4	5	4	4	R	
E1B-1	1	n/a	n/a	n/a	n/a	n/a	1	1	1	1	1	1	1	2	2	2	1	2	4	n/a	n/a	n/a	n/a	n/a	5	4	4	4	4	5	5	3	3	3	4	4	I	E1b
E1B-2	1	n/a	n/a	n/a	n/a	n/a	1	1	1	1	1	1	1	2	2	2	1	1	5	n/a	n/a	n/a	n/a	n/a	5	5	5	5	5	5	5	4	3	4	4	5	R	
E1B-3	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	5	4	4	5	4	5	5	4	4	4	4	5	4	4	4	4	5	4	I	
E1B-4	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1	2	5	5	4	5	5	5	4	4	4	5	4	5	4	2	3	4	5	5	R	
E1B-5	1	1	1	1	1	1	1	1	1	1	1	2	1	2	2	2	2	2	5	4	5	5	5	5	5	4	5	5	5	5	4	3	3	3	4	4	I	

Site name	Browning scale*																		Leaf loss**																Site type^	Vegetation community
	Overstorey						Midstorey						Understorey						Overstorey						Midstorey						Understorey							
	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016		
E1B-6	1	1	1	1	1	1	1	1	1	1	1	2	1	2	2	2	2	2	5	4	5	5	5	5	5	4	5	5	5	5	5	4	4	3	4	4	R	
E1B-8	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1	1	5	4	4	5	5	5	5	5	5	5	5	5	5	4	4	5	5	5	I	
E1B-7	1	1	1	1	1	1	1	2	1	2	1	1	1	2	2	2	2	2	5	4	4	5	5	5	5	4	3	3	5	5	4	2	4	4	4	4	R	
E1B-10	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	5	5	5	5	4	5	5	5	5	5	5	5	5	4	4	4	3	4	I	
E1B-9	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	2	2	5	5	5	5	5	5	5	4	4	5	5	5	5	4	3	4	4	4	R	
A7B-2	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2	2	2	5	3	3	4	5	5	5	4	5	5	5	5	5	2	2	3	4	4	I	
A7B-1	n/a	n/a	n/a	n/a	n/a	n/a	1	1	1	1	1	1	2	2	1	1	2	1	n/a	n/a	n/a	n/a	n/a	n/a	5	5	5	4	5	5	4	4	4	4	4	5	R	A7b
A7B-4	1	1	1	1	1	1	1	3	2	2	2	1	1	2	2	1	2	2	5	4	3	4	5	5	5	3	3	4	4	4	5	4	4	4	4	4	I	
A7B-3	1	1	1	1	1	1	1	1	1	2	2	1	1	2	2	2	2	2	5	4	4	5	5	4	5	4	4	5	5	4	4	3	4	4	4	4	R	
C9-1	1	1	1	1	1	1	1	1	1	1	1	2	1	2	2	1	2	2	5	4	5	5	5	5	4	4	5	5	4	4	4	3	4	5	4	4	I	
C9-3	1	1	1	1	1	1	1	2	1	1	1	1	1	2	2	3	2	2	5	4	4	4	4	4	4	3	4	5	4	4	4	3	3	4	3	3	R	C9
C9-2	1	1	1	1	1	1	1	1	1	2	2	1	2	2	2	2	2	2	5	5	5	5	5	5	4	4	4	4	4	4	3	4	3	3	4	4	I	
C9-4	1	1	1	1	1	1	1	3	2	2	2	2	1	2	2	2	2	3	5	3	5	5	4	4	4	3	3	3	3	4	4	3	3	4	3	3	R	

* Browning Scale 1 = Green (Healthy), 2 = Yellow (Senescent), 3 = Brown (Dead or dying foliage), ** Leaf loss scale (1 through to 5 with 1 indicating denuded branches and 5 indicating a full canopy of leaves), ^ I = Impact site, R = Reference site

Appendix H : Raw foliar cover data for Infrastructure Corridor

Site name	Cover (%)																								Bare soil (%)						Site type^	Vegetation community
	Overall						Overstorey						Midstorey						Understorey													
	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016		
E9-2	45	45	40	35	45	50	10	20	20	15	10	10	30	25	25	30	30	30	5	2	1	1	2	2	50	60	65	55	50	50	I	E9
E9-1	30	25	26	25	35	45	1	1	1	n/a	0.5	3	25	25	25	25	25	30	10	2	1	1	5	5	70	80	76	70	65	65	R	
E9-6	50	35	35	35	40	40	20	15	15	15	15	15	15	10	10	10	15	15	20	20	20	20	20	20	50	70	65	65	60	60	I	
E9-5	70	65	60	60	60	60	35	10	15	20	20	20	20	15	15	15	15	15	40	40	40	40	40	40	30	45	35	35	35	35	R	
A3-2	50	30	30	30	30	30	n/a	n/a	10	n/a	n/a	n/a	10	10	2	15	15	15	50	20	20	20	20	20	40	70	70	70	70	60	I	A3
A3-1	75	35	40	40	40	40	n/a	n/a	n/a	n/a	n/a	n/a	40	25	30	30	30	30	20	10	10	10	10	10	25	65	60	60	60	70	R	
A3-4	25	35	35	35	35	35	15	25	25	25	25	25	5	2	2	2	4	4	5	15	15	15	15	15	80	50	50	55	60	60	I	
A3-3	30	30	30	30	35	35	20	20	20	20	20	20	15	8	10	10	10	10	5	10	10	8	10	10	70	60	60	65	65	65	R	
A3-5	70	45	55	60	60	60	40	30	55	55	55	55	55	15	15	15	20	20	20	5	5	5	5	5	30	35	35	35	35	35	I	
A3-6	60	55	55	55	55	55	20	35	35	35	35	35	40	20	20	20	20	20	50	5	5	5	5	5	25	40	40	40	45	45	R	
S8-3	80	60	35	32	35	35	4	5	n/a	n/a	n/a	0	30	15	2	2	2	3	75	50	35	30	35	35	20	35	65	68	65	65	I	S8
S8-1	85	80	30	30	30	35	5	5	2	2	2	0	35	10	n/a	1	n/a	0	75	75	30	30	30	35	15	15	70	70	70	65	R	
S8-2	85	75	15	25	30	35	4	4	n/a	n/a	n/a	0	30	4	n/a	2	2	5	75	75	15	25	30	30	15	20	85	75	70	65	I	
S8-6	85	60	20	30	35	40	35	n/a	n/a	n/a	n/a	0	n/a	30	n/a	n/a	n/a	n/a	80	55	20	30	35	40	15	40	80	70	65	60	R	
S8-4	65	30	30	30	40	40	1	1	n/a	n/a	n/a	n/a	7	10	10	10	10	10	50	25	25	25	30	30	40	75	75	70	60	60	I	
S8-7	n/a	70	30	32	30	30	n/a	n/a	n/a	n/a	n/a	n/a	n/a	3	n/a	2	2	2	n/a	65	30	30	30	30	n/a	35	70	70	70	70	I	
S8-5	60	80	35	34	30	35	n/a	3	n/a	n/a	n/a	n/a	50	60	n/a	4	5	5	55	40	35	30	30	30	35	20	65	65	70	65	R	
E4-2	50	30	35	45	45	50	2	n/a	n/a	5	5	4	20	7	7	30	35	40	40	25	30	10	10	10	50	75	65	30	35	35	I	E4
E4-1	60	25	30	35	35	35	1	0.5	n/a	1	1	1	1	4	2	30	30	30	60	25	28	5	5	5	40	80	70	60	60	60	R	
E4-3	30	40	35	40	40	45	5	n/a	25	25	20	20	n/a	25	8	10	10	10	25	20	10	15	20	20	70	70	65	60	60	55	I	
E4-4	30	35	35	50	40	40	3	15	15	15	25	25	5	2	2	20	15	15	30	30	30	40	25	25	60	70	70	55	60	65	R	

Site name	Cover (%)																								Bare soil (%)						Site type^	Vegetation community
	Overall						Overstorey						Midstorey						Understorey													
	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016		
E4-5	75	70	70	75	75	75	5	25	25	25	20	25	1	1	1	1	5	10	75	50	50	65	60	60	25	25	35	20	25	25	I	
E4-6	80	65	75	80	60	60	15	25	3	5	20	20	7	2	2	5	3	5	80	50	70	80	50	50	20	35	25	15	40	40	R	
E4-7	45	30	30	35	35	40	5	2	3	3	5	5	40	3	2	2	2	5	10	30	30	35	35	35	35	65	65	60	60	60	I	
E4-8	40	30	30	40	40	40	n/a	1	1	1	n/a	0	30	4	4	5	10	10	20	25	25	35	35	35	60	70	70	60	60	60	R	
E4-9	80	60	60	60	60	60	5	3	3	5	5	10	30	20	20	20	20	20	80	50	50	50	50	50	10	45	45	40	40	40	I	
E4-10	80	60	65	65	65	70	4	7	7	7	5	5	5	20	25	25	25	30	75	40	45	45	45	45	20	35	30	30	30	30	R	
E4-11	80	55	25	30	30	35	1	2	2	1	1	1	40	7	5	5	5	5	80	45	20	25	30	30	20	50	75	70	70	65	I	
E4-12	75	45	10	20	25	35	10	4	n/a	n/a	n/a	n/a	90	20	n/a	2	2	5	70	20	10	20	25	30	25	60	90	80	75	65	R	
E4-14	60	40	40	45	60	60	15	20	20	20	20	20	8	4	4	4	20	20	50	40	40	40	50	50	40	60	50	50	40	40	I	
E4-13	35	60	60	62	75	75	2	4	4	4	5	5	2	2	2	2	3	5	30	60	60	60	70	70	70	35	35	35	25	25	R	
A2-1	40	35	30	45	40	40	5	5	5	5	5	5	40	7	7	30	15	15	5	25	20	10	25	25	55	75	65	40	60	55	I	
A2-7	15	20	25	35	20	30	5	7	8	5	5	5	10	1	1	1	20	20	5	20	22	30	3	5	80	90	75	65	80	70	R	
A2-2	55	45	45	50	50	50	n/a	n/a	n/a	n/a	n/a	n/a	50	35	35	20	20	20	10	10	10	30	30	30	40	60	60	45	45	45	I	
A2-10	95	70	70	75	75	75	10	10	15	15	15	15	95	25	10	10	10	10	5	35	45	50	50	55	5	35	30	25	25	25	R	
A2-3	50	75	75	75	75	75	40	75	75	75	70	70	10	7	7	5	5	5	5	3	2	1	1	1	30	20	20	25	25	20	I	
A2-11	50	50	50	50	50	55	35	50	50	50	50	50	20	5	5	5	2	4	5	2	1	1	0.5	1	40	65	65	45	45	40	R	A2
A2-4	40	40	50	50	50	55	n/a	n/a	n/a	n/a	n/a	n/a	10	15	20	20	15	15	30	25	40	40	45	45	65	65	50	50	50	40	I	
A2-12	17	30	35	37	35	40	2	5	5	2	0.5	0.5	4	2	2	2	3	4	13	30	35	35	30	40	75	70	65	60	65	60	R	
A2-6	50	40	40	45	60	60	30	30	30	35	35	35	50	10	10	10	15	15	20	10	10	10	20	15	40	45	35	35	40	40	I	
A2-5	60	50	50	50	50	55	20	20	20	20	20	20	60	25	25	30	35	30	20	15	15	10	20	20	30	45	40	35	45	45	R	

Site name	Cover (%)																								Bare soil (%)						Site type^	Vegetation community
	Overall						Overstorey						Midstorey						Understorey													
	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016		
A2-9	85	25	30	50	55	55	n/a	0.3	n/a	n/a	n/a	n/a	30	n/a	n/a	n/a	30	30	60	25	30	50	25	25	25	85	70	40	40	40	I	
A2-8	80	25	40	85	80	80	n/a	n/a	n/a	n/a	n/a	n/a	75	2	2	2	40	40	60	25	40	85	40	40	25	85	60	15	15	15	R	
A7B-6	25	45	45	45	40	50	13	30	35	40	25	15	5	7	7	10	15	15	7	15	15	15	20	20	60	40	40	40	60	50	I	
A7B-5	70	40	45	50	40	40	40	35	35	40	30	5	20	15	15	15	10	10	50	20	20	15	5	25	25	30	30	30	60	60	R	
A7B-7	30	n/a	2	10	20	20	15	n/a	n/a	n/a	n/a	n/a	30	n/a	n/a	n/a	n/a	n/a	15	n/a	2	10	20	20	70	100	98	90	85	80	I	A7B
A7B-9	n/a	50	45	50	50	50	n/a	8	8	10	10	10	n/a	40	35	40	40	40	n/a	5	5	4	5	5	n/a	50	50	45	50	50	I	
A7B-8	70	65	60	65	60	60	60	55	55	55	55	55	35	8	10	10	10	15	7	4	4	2	2	2	40	30	35	35	40	40	R	

^ I = Impact site, R = Reference site

Appendix I : Raw foliar condition data for Infrastructure Corridor

Site name	Browning scale*																		Leaf loss**																Site type^	Vegetation community
	Overstorey						Midstorey						Understorey						Overstorey						Midstorey						Understorey							
	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016		
E9-2	1	1	2	1	1	1	1	1	2	1	1	1	1	3	2	2	2	1	5	4	4	4	4	4	4	4	4	5	5	5	4	2	3	4	3	4	I	E9
E9-1	1	1	2	n/a	1	1	1	1	2	2	1	1	1	2	2	2	2	2	5	4	4	n/a	4	4	5	4	4	5	4	4	4	3	3	4	4	3	R	
E9-6	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	1	1	5	4	4	5	5	5	4	4	4	4	5	5	3	3	4	4	4	4	I	
E9-5	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1	1	4	4	4	5	5	5	4	4	4	5	5	5	4	3	4	4	4	4	R	
A3-2	n/a	n/a	1	n/a	n/a	n/a	1	1	1	1	1	1	2	3	2	2	1	2	n/a	n/a	5	n/a	5	n/a	4	4	5	4	4	5	3	3	4	3	n/a	4	I	A3
A3-1	n/a	n/a	n/a	n/a	n/a	n/a	1	1	2	1	1	1	2	3	2	2	1	2	n/a	n/a	n/a	n/a	n/a	n/a	4	4	3	4	5	5	3	3	2	3	3	4	R	
A3-4	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	1	2	5	4	4	5	5	5	5	4	4	4	5	5	3	3	3	3	4	4	I	
A3-3	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1	2	5	4	4	5	5	5	5	4	4	4	5	5	3	3	3	3	4	4	R	
A3-5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	4	4	4	5	5	5	4	4	4	4	5	5	3	4	3	3	4	4	I	
A3-6	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1	1	4	4	4	4	5	5	4	4	4	5	5	5	3	4	3	3	4	5	R	
S8-3	1	1	n/a	n/a	n/a	n/a	1	1	2	1	1	1	2	2	1	2	2	1	5	4	n/a	n/a	n/a	n/a	4	4	5	5	5	5	3	4	4	5	4	5	I	S8
S8-1	1	1	1	1	1	n/a	1	1	n/a	1	n/a	n/a	2	2	1	2	2	1	3	4	4	4	4	n/a	5	4	n/a	4	n/a	n/a	3	4	5	5	4	5	R	
S8-2	1	1	n/a	n/a	n/a	n/a	1	1	n/a	1	1	1	1	2	1	2	2	1	4	4	n/a	n/a	n/a	n/a	4	4	n/a	5	5	5	4	4	5	5	4	5	I	
S8-6	n/a	n/a	n/a	n/a	n/a	n/a	1	1	n/a	n/a	n/a	n/a	2	2	1	2	2	1	n/a	n/a	n/a	n/a	n/a	n/a	4	4	n/a	n/a	n/a	n/a	4	3	5	5	5	5	R	
S8-4	1	1	n/a	n/a	n/a	n/a	1	1	2	1	1	1	1	2	2	1	3	1	5	5	n/a	n/a	n/a	n/a	5	4	3	5	5	5	4	3	4	4	4	5	I	
S8-7	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1	3	1	1	1	n/a	2	1	2	1	1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	4	1	5	5	5	n/a	3	5	5	5	5	I	
S8-5	1	1	n/a	n/a	n/a	n/a	1	1	2	1	1	1	1	2	1	2	1	1	4	5	n/a	n/a	n/a	n/a	5	4	3	4	5	5	5	4	5	4	4	5	R	
E4-2	1	n/a	n/a	1	1	1	1	1	2	1	1	1	1	1	2	2	2	2	4	n/a	n/a	5	5	5	4	5	4	5	5	5	4	5	3	4	4	5	I	E4
E4-1	2	1	1	1	1	1	1	1	2	1	1	1	1	1	2	2	2	1	3	4	4	4	5	5	4	5	4	5	5	5	4	4	3	5	4	5	R	
E4-3	1	n/a	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	2	5	n/a	5	5	5	5	4	4	4	4	5	5	4	4	4	4	4	4	I	
E4-4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2	5	4	5	4	5	5	4	4	4	5	5	5	4	4	4	5	4	4	R	

Site name	Browning scale*																		Leaf loss**																Site type^	Vegetation community
	Overstorey						Midstorey						Understorey						Overstorey						Midstorey						Understorey							
	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016		
E4-5	1	1	1	2	1	1	1	1	1	1	1	1	2	2	2	2	1	2	4	4	4	4	4	5	4	5	5	4	5	5	3	4	4	3	4	4	I	
E4-6	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	1	2	4	5	5	5	4	5	4	5	5	5	5	5	3	4	4	4	4	4	R	
E4-7	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1	1	5	5	5	5	5	5	4	5	5	4	4	5	4	4	4	4	4	4	I	
E4-8	1	1	1	1	n/a	n/a	1	1	1	2	2	1	1	1	2	2	2	2	5	5	5	5	n/a	5	5	5	5	4	4	4	4	4	4	4	4	n/a	R	
E4-9	1	1	1	1	2	1	1	1	1	1	1	1	2	2	2	2	2	2	4	2	2	4	4	5	4	4	4	5	5	5	3	4	4	4	4	3	I	
E4-10	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	4	5	3	3	4	5	4	4	5	5	5	5	3	4	4	4	4	5	R	
E4-11	1	1	1	1	1	1	1	1	2	1	1	1	1	2	2	2	2	1	5	4	3	5	5	5	4	4	3	3	4	5	4	4	4	4	4	5	I	
E4-12	1	1	n/a	n/a	n/a	n/a	1	1	n/a	1	1	1	2	2	1	2	2	1	4	4	n/a	n/a	n/a	n/a	4	4	n/a	4	5	5	3	4	3	5	4	5	R	
E4-14	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	4	4	4	5	5	5	4	4	4	5	5	4	4	4	4	4	4	4	I	
E4-13	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1	2	5	4	4	5	5	5	5	4	4	4	5	5	4	4	3	4	4	3	R	
A2-1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1	5	4	4	4	4	5	5	5	5	5	5	5	5	4	4	5	5	5	I	
A2-7	1	1	1	2	1	1	1	1	1	1	1	1	1	1	2	2	1	1	5	4	4	4	5	5	5	4	4	5	5	5	4	5	5	5	4	5	R	
A2-2	1	n/a	n/a	n/a	n/a	n/a	1	3	1	1	1	1	1	1	1	2	2	1	5	n/a	n/a	n/a	n/a	5	5	4	4	4	5	5	5	4	4	4	5	n/a	I	
A2-10	1	1	1	1	1	1	1	2	1	1	1	1	1	2	2	2	1	1	5	4	4	5	5	5	5	4	4	5	5	5	5	4	4	5	4	4	R	
A2-3	1	1	1	1	1	1	1	2	1	2	1	1	1	2	2	2	2	2	4	3	3	4	5	5	4	2	3	4	4	5	4	3	2	3	3	4	I	
A2-11	1	1	2	1	1	1	1	1	1	1	2	1	1	1	2	2	2	1	5	4	4	5	5	5	5	4	4	5	3	5	5	4	3	4	3	5	R	A2
A2-4	1	n/a	n/a	n/a	n/a	n/a	1	1	1	1	1	1	1	1	2	1	1	1	5	n/a	n/a	n/a	n/a	n/a	5	4	5	5	5	5	5	4	3	5	5	5	I	
A2-12	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	5	4	5	5	5	5	5	4	5	5	5	5	5	4	4	5	4	5	R	
A2-6	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	4	4	4	4	4	5	4	4	4	4	4	4	3	3	3	3	3	3	I	
A2-5	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	5	4	4	4	5	5	4	4	4	3	4	3	3	3	3	3	3	3	R	
A2-9	n/a	1	n/a	n/a	n/a	n/a	1	n/a	n/a	n/a	1	1	1	1	2	2	2	1	n/a	3	n/a	n/a	n/a	n/a	5	n/a	n/a	n/a	5	5	4	4	3	4	4	5	I	

Site name	Browning scale*																		Leaf loss**																Site type^	Vegetation community
	Overstorey						Midstorey						Understorey						Overstorey						Midstorey						Understorey							
	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016		
A2-8	1	n/a	n/a	n/a	n/a	n/a	1	1	2	1	1	1	1	2	2	2	2	2	5	n/a	n/a	n/a	n/a	n/a	5	4	4	5	5	5	4	3	3	4	4	5	R	
A7B-6	1	1	2	1	2	2	1	1	2	1	1	1	3	2	2	2	2	1	5	4	4	4	3	3	5	4	4	5	4	4	3	2	3	3	4	4	I	A7B
A7B-5	1	1	2	1	3	1	1	1	1	2	2	1	3	2	2	2	1	1	4	3	4	3	3	3	4	4	4	4	2	3	2	2	3	3	4	4	R	
A7B-7	1	n/a	n/a	n/a	n/a	n/a	1	n/a	n/a	n/a	n/a	n/a	1	n/a	1	1	1	1	5	n/a	n/a	n/a	n/a	n/a	5	n/a	n/a	n/a	n/a	n/a	3	n/a	5	5	5	4	I	
A7B-9	n/a	1	1	1	1	1	n/a	1	2	1	1	1	n/a	1	2	2	2	2	n/a	4	4	4	4	4	n/a	4	4	5	4	4	n/a	3	4	4	3	3	I	
A7B-8	1	1	1	1	1	1	1	1	2	2	1	1	1	2	2	2	2	2	5	4	4	5	4	4	4	4	3	4	3	4	4	3	4	4	3	3	R	

Appendix J : Raw foliar cover data for Water Supply Borefield

Site name	Cover (%)																								Bare soil (%)						Site type^	Vegetation community
	Overall						Overstorey						Midstorey						Understorey													
	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016		
E2-1	35	40	10	12	20	30	n/a	n/a	n/a	n/a	n/a	n/a	5	2	5	2	20	25	35	40	5	10	2	5	65	65	90	85	80	70	I	
E2-4	60	70	25	30	30	35	4	n/a	n/a	n/a	n/a	n/a	5	20	10	10	15	20	30	60	15	20	15	15	50	30	75	70	70	65	R	
E2-2	40	55	50	50	50	50	20	10	10	15	15	15	40	20	20	25	25	25	40	25	25	20	20	20	60	50	48	45	45	45	I	E2
E2-3	45	50	9	25	30	30	11	15	3	5	10	10	10	5	1	1	2	2	35	30	5	20	25	25	55	70	80	75	70	70	R	
E2-5	40	60	15	18	20	25	n/a	1	n/a	n/a	n/a	n/a	35	25	n/a	10	15	15	15	50	15	8	10	20	65	45	85	82	80	75	I	
E2-6	35	55	6	15	20	20	5	4	n/a	n/a	n/a	2	5	3	n/a	10	15	15	30	50	6	5	5	5	70	50	94	85	85	85	R	
X1-1	40	70	15	20	25	25	10	10	5	5	5	5	25	15	n/a	15	25	25	35	60	12	3	3	5	50	35	85	70	75	75	I	
X1-2	75	40	4	10	10	10	3	2	n/a	1	1	3	10	6	n/a	5	5	10	25	40	4	4	4	5	70	65	95	90	90	90	R	
X1-3	75	50	50	45	45	45	n/a	n/a	n/a	n/a	n/a	n/a	2	4	2	5	5	5	75	45	15	40	40	40	25	55	88	50	50	55	I	
X1-5	50	50	25	55	55	55	3	2	n/a	n/a	n/a	n/a	10	5	n/a	25	25	25	40	45	25	30	30	30	40	55	73	45	45	45	R	
X1-4	35	50	20	45	35	40	8	7	n/a	n/a	n/a	n/a	8	6	1	5	3	5	25	40	20	45	45	35	70	60	80	55	65	65	I	
X1-6	35	45	45	70	70	70	n/a	n/a	n/a	n/a	n/a	n/a	5	5	5	25	25	25	25	45	45	55	50	50	70	50	50	35	30	30	R	
X1-7	50	40	10	35	25	25	3	7	5	5	3	n/a	5	7	1	5	5	5	40	25	7	25	20	20	35	70	88	65	75	75	I	
X1-8	50	55	12	40	20	30	5	5	1	2	n/a	n/a	25	6	1	2	5	10	20	50	10	35	20	20	50	55	87	60	80	70	R	X1
X1-9	50	60	10	20	25	30	5	2	n/a	n/a	n/a	n/a	15	15	2	2	2	3	30	50	8	20	25	30	60	45	88	80	75	70	I	
X1-10	40	55	53	70	60	65	n/a	n/a	n/a	n/a	n/a	n/a	14	25	20	30	30	30	27	50	45	50	45	45	65	45	45	50	50	45	R	
X1-11	65	60	10	30	30	35	4	5	n/a	n/a	n/a	n/a	12	6	5	20	25	35	30	55	5	15	5	4	35	45	90	65	70	65	I	
X1-12	35	45	25	35	35	40	15	5	n/a	n/a	n/a	n/a	5	2	1	1	4	5	25	40	25	35	35	35	75	55	75	65	65	60	R	
X1-13	35	65	8	25	25	30	n/a	n/a	n/a	n/a	n/a	n/a	7	3	3	2	2	5	25	65	5	25	25	25	60	65	92	70	75	70	I	
X1-14	70	55	10	28	35	40	2	3	n/a	n/a	n/a	n/a	25	15	3	3	1	2	45	40	7	25	35	40	30	55	90	75	65	60	R	
X1-15	35	50	4	10	20	25	10	3	n/a	n/a	n/a	n/a	30	5	2	8	20	20	5	45	2	2	2	5	60	60	96	90	80	75	I	

Site name	Cover (%)																								Bare soil (%)						Site type^	Vegetation community
	Overall						Overstorey						Midstorey						Understorey													
	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016		
X1-16	40	55	3	8	15	20	3	n/a	n/a	n/a	n/a	n/a	35	1	1	4	15	15	10	55	3	4	2	5	60	50	96	92	85	80	R	
M1-1	n/a	n/a	n/a	35	45	50	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.1	n/a	n/a	n/a	n/a	n/a	35	45	50	n/a	n/a	n/a	65	55	50	I	M1
M1-2	n/a	n/a	n/a	10	15	25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	2	4	2	n/a	n/a	n/a	8	10	25	n/a	n/a	n/a	85	85	75	R	
M1-3	n/a	n/a	n/a	40	50	50	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	40	50	50	n/a	n/a	n/a	60	50	50	I	
M1-4	n/a	n/a	n/a	42	55	60	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	2	5	3	n/a	n/a	n/a	40	50	60	n/a	n/a	n/a	70	40	40	R	
T1-3	30	45	27	35	35	40	1	1	n/a	n/a	n/a	n/a	25	7	2	5	5	5	20	40	25	30	30	35	70	65	71	55	60	60	I	T1
T1-1	45	60	16	85	60	60	10	5	n/a	n/a	n/a	n/a	10	15	1	1	2	2	30	40	15	80	60	60	60	40	82	15	40	40	R	
T1-4	45	40	12	50	45	45	n/a	n/a	n/a	n/a	n/a	n/a	35	20	2	1	5	5	10	20	12	50	40	40	60	65	86	45	50	50	I	
T1-2	40	45	25	45	40	45	2	1	n/a	n/a	n/a	n/a	3	6	2	2	3	5	40	40	25	45	40	40	60	60	75	55	60	55	R	

^ I = Impact site, R = Reference site

Appendix K : Raw foliar condition data for Water Supply Borefield

Site name	Browning scale*																		Leaf loss**																Site type^	Vegetation community
	Overstorey						Midstorey						Understorey						Overstorey						Midstorey						Understorey							
	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016		
E2-1	n/a	n/a	n/a	n/a	n/a	n/a	1	1	1	1	1	1	1	2	1	2	2	1	n/a	n/a	n/a	n/a	n/a	n/a	4	4	4	5	5	5	4	3	4	4	4	5	I	E2
E2-4	1	n/a	n/a	n/a	n/a	n/a	1	1	1	1	1	1	1	2	1	2	2	1	5	n/a	n/a	n/a	n/a	n/a	5	5	5	5	5	5	5	4	5	4	4	5	R	
E2-2	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	4	4	4	5	5	5	4	4	4	5	5	5	3	3	3	3	4	4	I	
E2-3	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2	2	1	5	5	3	5	4	5	4	5	5	5	5	5	4	3	5	4	5	5	R	
E2-5	1	1	n/a	n/a	n/a	n/a	1	1	n/a	1	1	1	1	2	1	2	2	2	5	5	n/a	n/a	n/a	n/a	5	5	n/a	4	5	5	5	4	4	3	5	5	I	
E2-6	1	1	n/a	n/a	n/a	1	1	1	n/a	1	1	1	1	2	1	2	1	2	5	4	n/a	n/a	n/a	5	5	4	n/a	5	5	5	5	2	5	4	5	4	R	
X1-1	1	1	2	1	1	1	1	1	n/a	1	1	1	1	2	1	2	2	2	5	4	4	3	5	5	5	4	n/a	4	5	4	5	4	4	4	5	4	I	X1
X1-2	1	1	1	1	1	1	1	1	n/a	1	1	1	1	2	2	2	1	2	5	4	5	4	5	5	5	4	n/a	5	5	4	5	4	4	4	5	4	R	
X1-3	1	n/a	n/a	n/a	n/a	n/a	1	1	1	1	1	1	1	2	2	2	1	2	4	n/a	n/a	n/a	n/a	n/a	4	5	5	5	4	5	4	4	4	4	4	4	I	
X1-5	1	1	n/a	n/a	n/a	n/a	1	1	n/a	1	1	1	1	2	1	2	2	2	4	4	n/a	n/a	n/a	n/a	4	4	n/a	5	4	5	4	4	5	4	4	4	R	
X1-4	1	1	n/a	n/a	n/a	n/a	1	1	1	1	1	1	1	2	1	2	1	2	5	4	n/a	n/a	n/a	n/a	5	4	5	5	5	5	5	4	4	3	4	4	I	
X1-6	n/a	n/a	n/a	n/a	n/a	n/a	1	1	1	1	1	1	1	2	2	2	2	2	n/a	n/a	n/a	n/a	n/a	n/a	5	4	4	5	5	5	5	4	3	4	4	4	R	
X1-7	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2	1	1	5	4	4	5	4	5	4	4	4	5	5	4	4	3	5	3	4	4	I	
X1-8	1	1	1	1	n/a	n/a	1	1	1	1	1	1	1	2	1	2	1	2	4	4	5	5	n/a	n/a	4	4	4	5	5	5	4	3	5	3	4	4	R	
X1-9	1	1	n/a	n/a	n/a	n/a	1	1	1	1	1	1	1	2	1	2	1	1	4	5	n/a	n/a	n/a	n/a	5	5	5	5	5	5	5	4	4	4	5	5	I	
X1-10	n/a	n/a	n/a	n/a	n/a	n/a	1	1	1	2	1	1	1	2	2	2	2	2	n/a	n/a	n/a	n/a	n/a	n/a	5	5	4	5	5	5	4	4	3	4	4	5	R	
X1-11	1	1	n/a	n/a	n/a	n/a	1	1	1	1	1	1	1	2	1	2	2	1	4	4	n/a	n/a	n/a	n/a	4	4	5	5	4	5	4	4	5	4	4	5	I	
X1-12	1	1	n/a	n/a	n/a	n/a	1	1	1	1	1	1	1	2	1	2	2	1	5	4	n/a	n/a	n/a	n/a	5	4	5	5	5	5	4	3	5	4	4	5	R	
X1-13	n/a	n/a	n/a	n/a	n/a	n/a	1	1	1	1	1	1	1	2	1	2	2	1	n/a	n/a	n/a	n/a	n/a	n/a	5	4	5	5	5	5	5	4	5	4	4	5	I	
X1-14	1	1	n/a	n/a	n/a	n/a	1	1	1	1	1	1	1	2	1	3	1	1	4	3	n/a	n/a	n/a	n/a	4	4	5	5	5	5	4	4	4	4	5	5	R	
X1-15	1	1	n/a	n/a	n/a	n/a	1	1	1	1	1	1	1	2	2	2	2	2	5	4	n/a	n/a	n/a	n/a	5	4	3	4	5	5	5	4	3	4	4	4	I	

Site name	Browning scale*																		Leaf loss**																Site type^	Vegetation community
	Overstorey						Midstorey						Understorey						Overstorey						Midstorey						Understorey							
	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016		
X1-16	1	n/a	n/a	n/a	n/a	n/a	1	1	1	1	1	1	1	2	2	2	2	2	5	n/a	n/a	n/a	n/a	n/a	5	4	5	5	5	5	5	3	3	4	5	5	R	
M1-1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	2	n/a	n/a	n/a	n/a	n/a	2	2	2	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	4	n/a	n/a	n/a	n/a	n/a	4	4	1	I	M1
M1-2	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1	1	3	n/a	n/a	n/a	2	1	2	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	5	5	2	n/a	n/a	n/a	4	4	4	R	
M1-3	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	2	1	2	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	3	4	4	I	
M1-4	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1	1	2	n/a	n/a	n/a	2	2	2	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	5	5	2	n/a	n/a	n/a	5	4	4	R	
T1-3	1	1	n/a	n/a	n/a	n/a	1	1	1	1	1	1	1	1	2	2	1	1	5	4	n/a	n/a	n/a	n/a	5	4	3	4	5	5	4	4	3	4	5	5	I	T1
T1-1	1	1	n/a	n/a	n/a	1	1	1	3	1	1	2	2	2	1	2	2	n/a	5	4	n/a	n/a	n/a	n/a	5	4	1	5	5	5	5	3	5	4	4	4	R	
T1-4	n/a	n/a	n/a	n/a	n/a	n/a	1	1	1	2	1	1	1	2	1	2	1	2	n/a	n/a	n/a	n/a	n/a	n/a	5	4	5	3	5	5	4	3	5	3	5	4	I	
T1-2	1	1	n/a	n/a	n/a	n/a	1	1	1	1	1	1	1	2	1	3	1	2	5	4	n/a	n/a	n/a	n/a	5	4	5	5	5	5	5	3	5	3	4	4	R	

Appendix L : Indicator species

Site	Site type	Indicator species	2015 Cover (%)	2016 Cover (%)	2015 No. plants	2016 No. Plants
Operations Area						
A7a-5	Impact	*Senna artemisioides* subsp. *filifolia*	1	2	2	4
A7a-6	Reference	*Senna artemisioides* subsp. *filifolia*	2	2	4	4
A7a-10	Impact	*Dodonaea rigida*	0.5	1	5	5 to 10
A7a-9	Reference	*Dodonaea rigida*	3	3	5 to 10	5 to 10
A7a-8	Impact	*Triodia basedowii*	1	1	10 to 20	10 to 20
A7a-7	Reference	*Triodia basedowii*	1	1	30 to 40	30 to 40
A7a-1	Impact	*Ptilotus obovatus*	1	1	30 to 40	30 to 40
A7a-4	Reference	*Ptilotus obovatus*	1	2	10 to 20	25
A7a-2	Impact	*Triodia basedowii*	25	25	400 to 500	400 to 500
A7a-3	Reference	*Triodia basedowii*	20	20	500 to 1000	500 to 1000
C9-1	Impact	*Senna artemisioides* subsp. *filifolia*	5	5	30 to 40	30 to 40
C9-3	Reference	*Senna artemisioides* subsp. *filifolia*	15	15	30 to 40	30 to 40
C9-2	Impact	*Ptilotus obovatus*	0.5	0.5	10 to 20	10
C9-4	Reference	*Ptilotus obovatus*	1	1	40 to 50	40-50
E1b-1	Impact	*Triodia basedowii*	60	60	400 to 500	400 to 500
E1b-2	Reference	*Triodia basedowii*	5	5	20 to 30	20 to 30
E3-1	Impact	*Triodia desertorum*	45	45	400 to 500	400 to 500
E3-2	Reference	*Triodia desertorum*	60	65	500 to 1000	500 to 1000
E1b-8	Impact	*Triodia basedowii*	3	3	30 to 40	30 to 40
E1b-7	Reference	*Triodia basedowii*	0.1	1	5 to 10	5 to 10
A7b-2	Impact	*Acacia aneura*	30	30	5 to 10	5 to 10
A7b-1	Reference	*Acacia aneura*	30	40	50 to 100	50 to 100
E3-3	Impact	*Anthotroche pannosa*	1	1	5 to 10	5 to 10
E3-4	Reference	*Anthotroche pannosa*	0.1	0.1	2	2
A7b-4	Impact	*Triodia basedowii*	10	10	50 to 100	50 to 100
A7b-3	Reference	*Triodia basedowii*	2	2	5 to 10	5 to 10
E1b-3	Impact	*Triodia basedowii*	60	60	200 to 300	200 to 300
E1b-4	Reference	*Triodia basedowii*	25	25	200 to 300	200 to 300
E1b-5	Impact	*Triodia basedowii*	35	35	400 to 500	400 to 500
E1b-6	Reference	*Triodia basedowii*	25	25	200 to 300	200 to 300

Site	Site type	Indicator species	2015 Cover (%)	2016 Cover (%)	2015 No. plants	2016 No. Plants
E1b-10	Impact	*Triodia basedowii*	40	40	400 to 500	400 to 500
E1b-9	Reference	*Triodia basedowii*	3	3	5 to 10	5 to 10
E3-5	Impact	*Anthotroche pannosa*	4	4	20 to 30	20 to 30
E3-6	Reference	*Anthotroche pannosa*	1	1	5 to 10	10
Infrastructure Corridor						
A3-2	Impact	*Eremophila clarkei*	1	1	5 to 10	5 to 10
A3-1	Reference	*Eremophila clarkei*	1	1	5 to 10	5 to 10
A3-4	Impact	*Acacia tetragonophylla*	2	2	4	4
A3-3	Reference	*Acacia tetragonophylla*	2	2	3	3
A3-5	Impact	*Dodonaea lobulata*	10	10	10 to 20	10 to 20
A3-6	Reference	*Dodonaea lobulata*	15	15	50 to 100	50 to 100
E9-6	Impact	*Triodia scariosa*	20	20	100 to 200	100 to 200
E9-5	Reference	*Triodia scariosa*	35	35	300 to 400	300 to 400
E9-2	Impact	*Acacia aneura*	10	10	10 to 20	10 to 20
E9-1	Reference	*Acacia aneura*	15	15	5 to 10	5 to 10
A2-6	Impact	*Triodia scariosa*	20	20	50 to 100	50 to 100
A2-5	Reference	*Triodia scariosa*	20	20	100 to 200	100 to 200
E4-3	Impact	*Leptosema chambersii*	3	3	100 to 200	100 to 200
E4-4	Reference	*Leptosema chambersii*	1	1	50 to 100	50 to 100
E4-5	Impact	*Callitris preissii*	1	1	5 to 10	5 to 10
E4-6	Reference	*Callitris preissii*	0.25	0.5	5 to 10	5 to 10
E4-2	Impact	*Allocasuarina spinosissima*	25	30	400 to 500	400 to 500
E4-1	Reference	*Allocasuarina spinosissima*	2	2	5 to 10	5 to 10
A2-1	Impact	*Triodia desertorum*	5	5	50 to 100	50 to 100
A2-7	Reference	*Triodia desertorum*	1	3	40 to 50	40 to 50
A2-9	Impact	*Allocasuarina spinosissima*	25	25	400 to 500	400 to 500
A2-8	Reference	*Allocasuarina spinosissima*	35	35	400 to 500	400 to 500
E4-7	Impact	*Triodia desertorum*	25	25	50 to 100	50 to 100
E4-8	Reference	*Triodia desertorum*	10	10	50 to 100	50 to 100
A2-2	Impact	*Aluta maisonneuvei* subsp. *auriculata*	25	25	300 to 400	300 to 400
A2-10	Reference	*Aluta maisonneuvei* subsp. *auriculata*	25	25	50 to 100	50 to 100
E4-9	Impact	*Triodia rigidissima*	50	50	500 to 1000	500 to 1000

Site	Site type	Indicator species	2015 Cover (%)	2016 Cover (%)	2015 No. plants	2016 No. Plants
E4-10	Reference	*Triodia rigidissima*	45	50	500 to 1000	500 to 1000
A2-3	Impact	*Acacia aneura*	70	70	10 to 20	10 to 20
A2-11	Reference	*Acacia aneura*	25	25	30 to 40	30 to 40
E4-11	Impact	*Triodia rigidissima*	20	20	50 to 100	50 to 100
E4-12	Reference	*Triodia rigidissima*	5	6	50 to 100	50 to 100
S8-2	Impact	*Leptosema chambersii*	2	2	40 to 50	40 to 50
S8-6	Reference	*Leptosema chambersii*	15	20	500 to 1000	500 to 1000
S8-3	Impact	*Triodia rigidissima*	2	2	100 to 200	100 to 200
S8-1	Reference	*Triodia rigidissima*	5	5	400 to 500	400 to 500
S8-4	Impact	*Chrysitrix distigmatosa*	1	1	400 to 500	400 to 500
S8-7	Impact	*Chrysitrix distigmatosa*	2	3	500 to 1000	500 to 1000
S8-5	Reference	*Chrysitrix distigmatosa*	5	5	500 to 1000	500 to 1000
A2-4	Impact	*Aluta maisonneuvei* subsp. *auriculata*	25	30	100 to 200	100 to 200
A2-12	Reference	*Aluta maisonneuvei* subsp. *auriculata*	25	30	100 to 200	100 to 200
E4-14	Impact	*Triodia rigidissima*	50	50	400 to 500	400 to 500
E4-13	Reference	*Triodia rigidissima*	50	50	500 to 1000	500 to 1000
A7b-6	Impact	*Aluta maisonneuvei* subsp. *auriculata*	3	3	5 to 10	5 to 10
A7b-5	Reference	*Aluta maisonneuvei* subsp. *auriculata*	5	5	5 to 10	5 to 10
A7b-7	Impact	*Aluta maisonneuvei* subsp. *auriculata*	3	3	100 to 200	100 to 200
A7b-9	Impact	*Aluta maisonneuvei* subsp. *auriculata*	20	20	50 to 100	50 to 100
A7b-8	Reference	*Aluta maisonneuvei* subsp. *auriculata*	5	5	30 to 40	30 to 40
Water Supply Borefield						
E2-5	Impact	*Triodia basedowii*	4	4	400 to 500	400 to 500
E2-6	Reference	*Triodia basedowii*	2	2	200 to 300	200 to 300
X1-1	Impact	*Triodia basedowii*	3	3	200 to 300	200 to 300
X1-2	Reference	*Triodia basedowii*	3	3	400 to 500	400 to 500
E2-1	Impact	*Triodia basedowii*	1	3	30 to 40	50 to 100
E2-4	Reference	*Triodia basedowii*	1	3	40 to 50	50 to 100
E2-2	Impact	*Eucalyptus gongylocarpa*	15	15	2	2
E2-3	Reference	*Eucalyptus gongylocarpa*	10	10	1	1
X1-15	Impact	*Triodia basedowii*	1	2	40 to 50	40 to 50
X1-16	Reference	*Triodia basedowii*	1	3	30 to 40	50 to 100

Site	Site type	Indicator species	2015 Cover (%)	2016 Cover (%)	2015 No. plants	2016 No. Plants
X1-11	Impact	*Keraudrenia velutina* subsp. *Velutina*	1	2	30 to 40	30 to 40
X1-12	Reference	*Keraudrenia velutina* subsp. *velutina*	20	25	500 to 1000	500 to 1000
T1-3	Impact	*Keraudrenia velutina* subsp. *velutina*	10	10	50 to 100	50 to 100
T1-1	Reference	*Keraudrenia velutina* subsp. *velutina*	5	5	50 to 100	50 to 100
T1-4	Impact	*Keraudrenia velutina* subsp. *velutina*	2	8	10 to 20	30 to 40
T1-2	Reference	*Keraudrenia velutina* subsp. *velutina*	10	20	50 to 100	100 to 200
M1-3	Impact	*Keraudrenia velutina* subsp. *velutina*	40	50	100 to 200	200 to 300
M1-4	Reference	*Keraudrenia velutina* subsp. *velutina*	40	50	100 to 200	200 to 300
M1-1	Impact	*Triodia basedowii*	5	5	100 to 200	100 to 200
M1-2	Reference	*Triodia basedowii*	2	2	10 to 20	10 to 20
X1-13	Impact	*Keraudrenia velutina* subsp. *velutina*	5	5	100 to 200	100 to 200
X1-14	Reference	*Keraudrenia velutina* subsp. *velutina*	10	15	400 to 500	400 to 500
X1-9	Impact	*Triodia basedowii*	10	15	100 to 200	100 to 200
X1-10	Reference	*Triodia basedowii*	45	45	500 to 1000	500 to 1000
X1-7	Impact	*Triodia basedowii*	5	5	50 to 100	50 to 100
X1-8	Reference	*Triodia basedowii*	0.25	5	10 to 20	50 to 100
X1-4	Impact	*Triodia basedowii*	1	3	100 to 200	100 to 200
X1-6	Reference	*Triodia basedowii*	50	50	500 to 1000	500 to 1000
X1-3	Impact	*Keraudrenia velutina* subsp. *velutina*	0.5	05	10 to 20	10 to 20
X1-5	Reference	*Keraudrenia velutina* subsp. *velutina*	0.75	0.75	10 to 20	20 to 30

Appendix M : Monitoring site photos

Photos are provided in a separate attachment

ecological AUSTRALIA

ISO 14001 Environmental Management

AS/NZS 4801:2001 Occupational Health and Safety Management

ISO 9001 Quality Management

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